

NOAA Manual NOS NGS 2



Input Formats and Specifications of the National Geodetic Survey Data Base

Volume II. Vertical Control Data

Rockville, Md.
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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Survey

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PREFACE

The User's Guide to the "Input Formats and Specifications of the National Geodetic Survey Data Base," which has come to be commonly known as the "Blue Book," is a standard vehicle for the transmittal of raw geodetic data in computer-readable form. Its purpose is to serve as a "pipeline" conveying the flow of geodetic data, both archival and newly acquired, from its holders and producers to the National Geodetic Survey for centralized processing, integration into the national geodetic networks, and timely dissemination to its users among the general public.

The concept of such a standard vehicle was articulated as early as 1974 by the Project Manager for the New Adjustment of the North American Datum, Captain John D. Bossler, NOAA, (now Director), National Geodetic Survey. The need for such a computerized medium became obvious in the course of preparation for the New Adjustment of the North American Datum, and grew more pressing with the passage of time. The task of putting together this User's Guide was assigned to me in mid-1975.

The production of the "Blue Book," as it now stands, was a monumental task involving widespread consultation, coordination, systems analysis, and standard setting. I benefited greatly from the work of the late Carl F. Kelley and from that of Ms. Jeannie H. Holdahl, who had put together a preliminary set of formats and specifications for Chapters 1, 2, and 3. Although the "Blue Book" in its present form bears little resemblance to that early version, their pioneering work served as a valuable basis on which to build and improve. Ms. Nancy L. Morrison co-authored the Vertical Control portion of the "Blue Book" (Chapters 5, 6, and 7). She organized the data flow, sketched out the respective format diagrams, and prepared a draft of the accompanying text.

The authors gratefully acknowledge the comments and ideas of many others who reviewed various editions of this work. The advice and criticism of users of this publication in the formulative period have been invaluable.

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NOTE: Contents are current up to and including Revision 801001.

NOTE: Volume I (Chapters 1-4, Annexes A-I,K) contains input formats and specifications for horizontal control data.

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Chapter 5

VERTICAL CONTROL (VERT) DATA

INTRODUCTION

For coding and processing purposes, the data associated with geodetic vertical control (VERT data) have been divided into three groups. The three vertical control data groups are (1) the field observations of elevation differences between survey points (OBS data), (2) descriptive data including original descriptions and recovery descriptions (DESC data), and (3) adjusted elevations (ELEV data). Detailed instructions and formats for the coding and keying of the OBS, DESC, and ELEV vertical control data sets are contained in Chapters 6, 7, and 8, respectively.

Although data of all three types are normally generated in connection with a vertical control survey project, OBS, DESC, and ELEV data must be submitted to NGS as separate data sets. There are two modes in which vertical control data may be submitted to NGS for insertion in the National Geodetic Survey Data Base. In order of preference, they are:

MODE 1 - Field Observations and Descriptive Data (VERT OBS and VERT DESC data)

MODE 2 - Adjusted Elevations and Descriptive Data (VERT ELEV and VERT DESC data).

The foregoing implies that every vertical control survey project (or several projects submitted as one "job" - see below) will be received at NGS as two distinct data sets: either OBS and DESC data sets under MODE 1, or ELEV and DESC data sets under MODE 2. The two data sets of each vertical control job must be submitted at the same time.

There are distinct benefits to be realized when vertical control data intended for insertion in the National Geodetic Survey Data Base are submitted in the MODE 1 configuration. Because the field observations which connect the survey points are given, MODE 1 data can be rigorously combined with data held by NGS and incorporated (adjusted) into the national vertical control network. This process insures that the elevations of the new survey points will be consistent with the existing vertical control in that area. By contrast, MODE 2 data consist of isolated points whose elevations are accepted as determined by the submitting agency. Because the connecting observations are not available, these elevations cannot be verified, and they cannot be rigorously updated when the vertical control network in their vicinity is readjusted.

For reasons cited in the preceding paragraph, vertical control data intended for insertion in the National Geodetic Survey Data Base should be submitted as MODE 1 data. MODE 2 data will be accepted only on an exception basis after consultation between NGS and the submitting agency.

JOB CODE AND SURVEY POINT NUMBERING

The basic unit or grouping of data to be submitted is given the name "job". A vertical control job may consist of data for a maximum 9999 survey points - see definition of "survey point" below. A job may consist of a single project (i.e., one unit of field work), or a number of projects may be included in one job. It is suggested that geographic proximity be the determining factor in selecting vertical control projects for inclusion in any one job. This approach eliminates duplicate keying of DESC data for vertical control survey projects which have points in common (e.g., a releveling over a previously established line, when both projects are to be submitted for insertion in the National Geodetic Survey Data Base).

A two-character alphanumeric code must be assigned to each vertical control job submitted by an agency in accordance with this publication. This job code, the data set type, the name of the submitting agency, and the data set creation date will serve to uniquely identify every data set received by NGS. The first character of the two-character job code must always be a letter; the second character may be either a letter or a number (1 through 9). Begin the assigning of job codes with A1 and end with ZZ, i.e., A1, A2, ..., B1, ..., Z1, ..., Z9, AA, AB, ..., ZZ. This allows for a total of 910 uniquely identified vertical control jobs to be submitted by any one agency. Should this sequence be exhausted, start assigning job codes again from the beginning: A1, A2, etc.

A vertical control point is defined as a survey point which is monumented (or otherwise permanently marked) and/or described and whose (adjusted) elevation is given (ELEV data), whose elevation is to be determined in an adjustment (OBS data), or whose elevation is available from other sources. A vertical control point is commonly known as a "bench mark" (BM). A survey point, in turn, is defined as any point which has one or more elevation differences measured to it or from it. A survey point may be a temporary bench mark (TBM, neither permanently marked nor described and therefore nonrecoverable), a described TBM, or a permanent bench mark (monumented and described). Henceforth, the term "bench mark" will be understood to also include the special class of described temporary bench marks (TBMs).

Each survey point that is leveled to in a vertical control job must be assigned a unique four-digit serial number (not necessarily consecutive)

LEGEND

- Bench Mark
- Temporary Bench Mark
- ⊗ Junction TBM

- Epoch 1 Project
- - - - Epoch 2 Project
- Epoch 3 Project

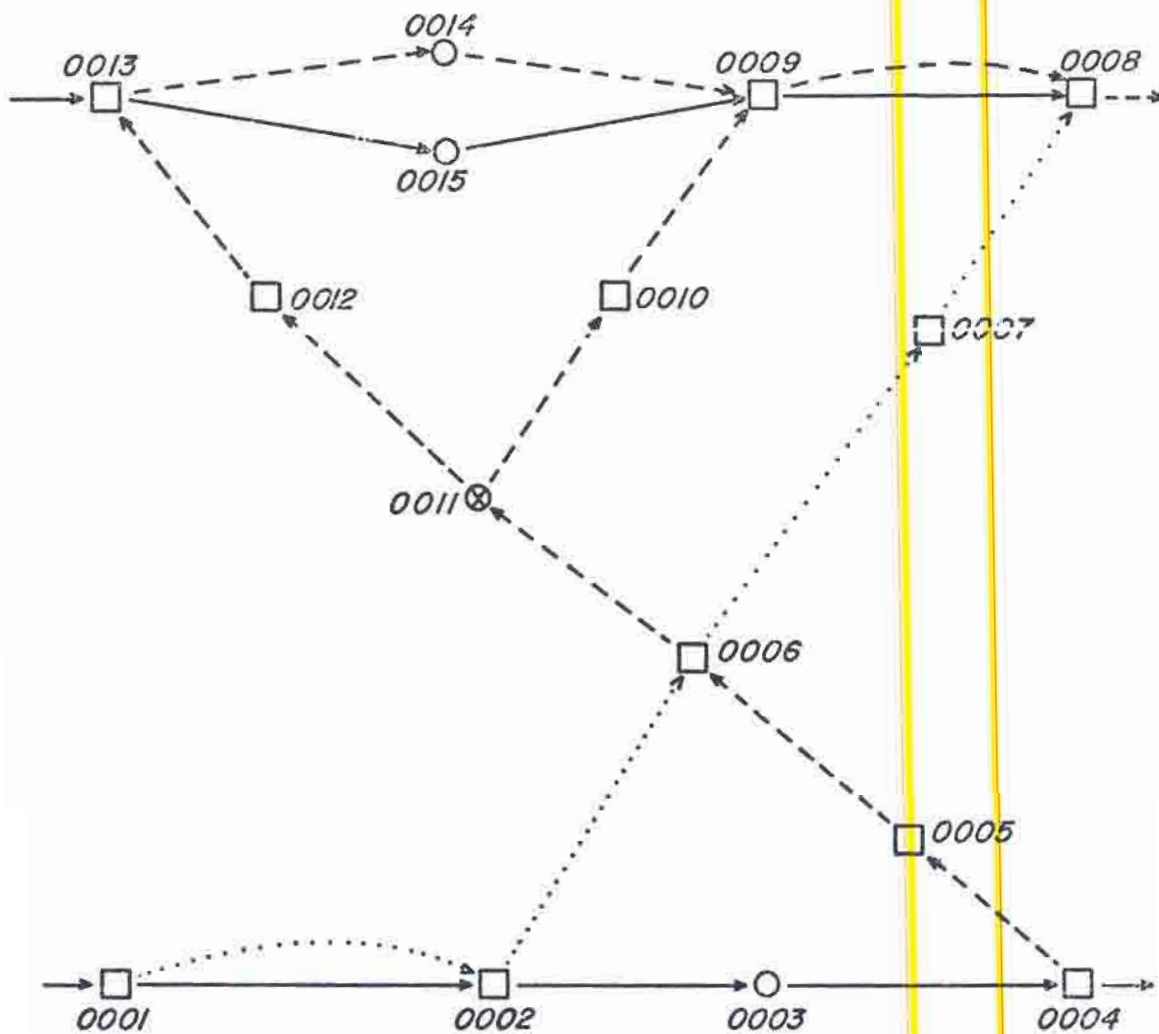


FIGURE 5-1 - Example of vertical survey point numbering.

in the range 0001 through 9999. If the number of survey points exceeds 9999, the vertical control data in question must be divided and submitted as two or more jobs. In general, level lines should not be subdivided. Figure 5-1 illustrates the assignment of survey point serial numbers (SPSNs). This numbering system provides a unique identifier for every survey point which is leveled in a vertical control job. The same survey point serial number (SPSN) must be consistently used whenever reference is made to the same point in either the OBS, DESC, or ELEV data sets of a vertical control job. All survey points for which recovery descriptions are written in this current project, but which are not leveled in this current project, will be assigned the SPSN code 0000.

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As pointed out in the INTRODUCTION, a vertical control job consists of two separate data sets - either the VERT OBS and VERT DESC data sets under MODE 1, or the VERT ELEV and VERT DESC data sets under MODE 2. When MODE 2 data are submitted, there will be one-to-one correspondence between points in the respective ELEV and DESC data sets, because every control point in the ELEV data set must also have an original description and/or recovery description(s) in the corresponding DESC data set. When MODE 1 data are submitted, however, there will normally be a greater number of points in the OBS data set than in the corresponding DESC data set. This condition is brought about by the fact that there are, in general, temporary bench marks (TBMs) in the OBS data set for which no descriptive data have been prepared. It must be emphasized, however, that descriptive data should exist for all recoverable vertical control points.

When the data-recording medium is magnetic tape (see below), the two data sets of a vertical control job must be submitted as two separate files. These files may be on the same reel of tape or on different reels if the data are organized so that a tape contains data sets of only one type (e.g., VERT OBS data sets) when many jobs are being submitted. When the data-recording medium is punched cards, the two data sets must be submitted as two separate decks. In any case, the first record of every data set (see Chapters 6, 7, and 8) must contain the information by means of which the respective data sets are positively identified and correlated - the job code, the data set type, the name of the submitting agency, and the data set creation date.

MEDIA FOR SUBMITTING DATA

Although in principle any computer-readable, general-purpose data-recording medium can be handled, the two media acceptable to NGS on a routine basis at the present time are punched cards (80 columns) and standard 1/2-inch magnetic tape. Magnetic tape is the preferred medium for both small and large volumes of data; agencies submitting

large volumes of data should use this medium exclusively. Punched cards should be used only for small, isolated jobs.

When the data are submitted as decks of punched cards, care must be taken to package each deck separately in order to minimize the likelihood of cards from different decks becoming intermingled. Provision is made for a sequence number to appear on every card of a deck; however, only the first card of each deck contains the deck identification data. The following information must be given for each data set submitted as a deck of cards:

1. Name and address of the submitting agency.
2. Contents of the deck by job code and data type (e.g., A1 VERT OBS, XX VERT DESC, etc.).
3. Character representation code (BCD, EBCDIC, etc.) and/or keypunch equipment used (e.g., IBM 026, IBM 029, etc.).
4. Name and telephone number of person to be contacted in case of difficulty with the data.

This information should be given in a letter of transmittal, a copy of which should be packed with the data set in question.

When the data are submitted as files of formatted records on magnetic tape, the following information is expected to be given for each reel of tape:

1. Name and address of the submitting agency.
2. Reel number or identification symbol assigned by the submitting agency.
3. Number of files and contents of each file by job code and data type (e.g., A1 VERT OBS, XX VERT DESC, etc.).
4. Computer system on which the tape was created (e.g., IBM 360/XXX, CDC 6600, etc.).
5. Internal label information (e.g., non-labeled, standard IBM label, etc.).
6. Number of tracks (7 or 9) and parity (even or odd).
7. Recording density (556, 800, or 1600 BPI).
8. Record length (LRECL) and block size (BLKSIZE).

9. Character representation code (BCD, EBCDIC, etc.) and keytape equipment designation, if applicable.
10. Name and telephone number of person to be contacted in case of difficulty with the data.

In addition to being given in the respective letter of transmittal, this information should be entered on one or more "stick-on" labels affixed to the magnetic tape reel.

A letter of transmittal in which the data are described and itemized should always be prepared for each data shipment. One copy should be enclosed with the data shipment, one sent by separate mail to NGS, and another copy should be retained by the sender. See ANNEX K for the current mailing instructions. In every case, the submitting agency should retain a backup copy of all data included in a shipment until the receipt of that specific data is acknowledged by NGS.

CODING, KEYING, AND DATA VERIFICATION

All data submitted to NGS for insertion in the National Geodetic Survey Data Base must be coded and keyed in strict conformity with the formats and specifications contained in this publication. In addition, the keying of all data must be verified. Detailed formats and specifications for the coding and keying of vertical control jobs are contained in Chapter 6 (VERT OBS data), Chapter 7 (VERT DESC data), and Chapter 8 (VERT ELEV data). The formats were designed to allow the keying and verification of the data to be accomplished on standard keypunch or keytape equipment. The 80-character record (one punched card image) has been adopted for all applications.

In keying the data entries, care must be taken to insure that alphabetic characters (letters) are always keyed using the alphabetic keys on the keying device, and that numeric characters (numbers) are always keyed using numeric keys. In particular, the miskeying of the following characters must be avoided:

0 - number "zero"	1 - number "one"	2 - number "two"
0 - letter "O"	L - letter "L"	Z - letter "Z"

SPECIAL CHARACTERS

In addition to alphabetic characters (letters A through Z) and numeric characters (numbers 0 through 9), the following special characters are allowed:

(*) asterisk	(+) plus sign
() blank or space	(-) minus sign or hyphen
(,) comma	(=) equal sign
(.) period or decimal point	(/) slash or solidus
(\$) dollar sign	(() left parenthesis
	()) right parenthesis

NOTE: A further restriction on characters is imposed for Bench Mark designations (see Annex D).

*
*

SEQUENTIAL RECORD NUMBERING

The first six characters of every record are reserved for a record sequence number. The purpose of the sequential numbering of records is to insure that the proper sequence of individual records in a data set can be verified and, if necessary, restored. The record sequence numbers must form one continuing sequence throughout each data set, starting with the first record (the Data Set Identification Record) and ending with the last record (the Data Set Termination Record).

Start with assigning sequence number 000010 to the first record in the data set (the Data Set Identification Record) and increment by 10 on each successive record. This numbering system allows up to nine records to be inserted between any two originally numbered records without the necessity of renumbering any records in the data set. Even when a large block of omitted records must be inserted, only a few of the existing records will have to be renumbered. However, to allow for the detection of missing records, all insertions and/or deletions which cause deviation from the basic 000010, 000020, 000030, etc. "increment-by-ten" record sequence must be accounted for in the respective letter of transmittal.

Discounting any after-the-fact insertions, the above-described sequential numbering system will permit a maximum of 99,999 uniquely numbered records in any one data set. Should there ever be a need for a greater number of records in a data set, retain only the last six digits of the higher sequence numbers, i.e., ... 999980, 999990, 000010, etc.

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Chapter 6

VERTICAL OBSERVATION (VERT OBS) DATA

INTRODUCTION

The purpose of this chapter is to provide detailed specifications and instructions for the coding and keying of the observation data set of a vertical control job. As was explained in Chapter 5, a vertical control job consists of two distinct data sets which must be submitted together. The companion data set to the vertical observation (VERT OBS) data set treated in this chapter is the data set containing original descriptions and/or recovery descriptions for the control points which occur in the vertical control job. This descriptive (VERT DESC) data set is treated in Chapter 7.

VERT OBS DATA SET RECORDS

The data which constitute a VERT OBS data set are organized into four categories:

1. Line Identification Data
2. Survey Equipment Data
3. Field Abstract Data
4. Observation Data

Within these categories, the respective data have been grouped into one or more logical units called "records." A record is a string of characters containing data coded according to a specific format. Every record in a VERT OBS data set consists of 80 characters or "columns" (standard punched card image). Within each record, the 80 columns are divided into fixed-length "character fields," each field being the space reserved for a specific data item. Accordingly, for every desired data item, there exists a field of appropriate length into which the data item in question is to be entered after it is converted into a string of alphanumeric characters. The set of rules according to which specific data items are converted into strings of alphanumeric characters to be entered in the fields of a record is known as the "format" of that record.

The types of records which may appear in a VERT OBS data set are listed in Table 6-1. Each type of record has been given a name, and a block diagram illustrating the respective format has been prepared to serve as a model for that record - see FORMAT DIAGRAMS.

Except for the first and last records of the data set, the second character field of each record (columns 7-10) contains a two-digit numerical data code, preceded and followed by an asterisk, which specifies the type of that record (*10*, *11*, ..., *43* - see Table 6-1). The first and last records of the data set (the Data Set Identification Record and the Data Set Termination Record) display the two-character alphanumeric job code assigned by the submitting agency in this field (*A1*, *A2*, ..., *ZZ* - see Chapter 5). The first character field of every record (columns 1-6) is reserved for the respective record sequence number - see Chapter 5. The remaining portion of each record (columns 11-80) contains character fields which are peculiar to each individual record type.

TABLE 6-1
VERTICAL OBSERVATION DATA SET RECORDS

	<u>FIRST RECORD</u>
AA	- Data Set Identification Record
	<u>LINE IDENTIFICATION DATA</u>
10	- Line Information Record
11	- Line Title Record (Optional)
12	- Line Title Continuation Record (Optional)
13	- Line Title Continuation Record (Optional)
14	- Line Title Continuation Record (Optional)
15	- Comment Record (Optional)
	<u>SURVEY EQUIPMENT DATA</u>
20	- Instrument Information Record
21	- Rod Information Record
22	- Rod Standardization Record
23	- Rod Calibration Record
	<u>FIELD ABSTRACT DATA</u>
30	- Field Abstract Record
	<u>OBSERVATION DATA</u>
40	- Survey Equipment Record
41	- Running Record
42	- River/Valley Crossing Record
43	- Correction/Rejection Record
	<u>LAST RECORD</u>
AA	- Data Set Termination Record

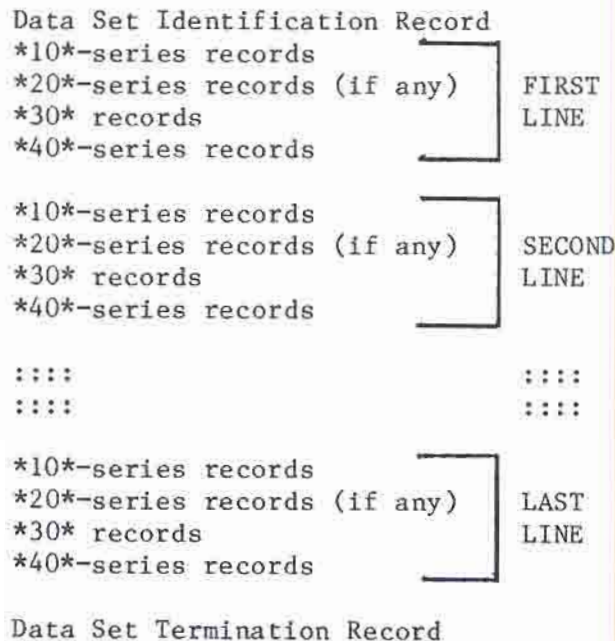
Note: The symbol *AA* denotes the two-character job code assigned by the submitting agency - see Chapter 5.

STRUCTURE OF THE VERT OBS DATA SET

The first record of a VERT OBS data set must be the Data Set Identification Record which contains the required information to identify the data set and to correlate it with its companion VERT DESC data set - job code, data type (VERT OBS), name of submitting agency, and date the data set was created. The last record of the data set must be the Data Set Termination Record. It is the only other record in the data set on which the respective job code appears in the same field (columns 7-10) as on the Data Set Identification Record.

The VERT OBS data set records which are bracketed by these two delimiting records may pertain to one or more units of field work; i.e., field observation data for several leveling lines may be submitted in one VERT OBS data set under the same job code, provided that the total number of survey points (bench marks and temporary bench marks) in the job does not exceed 9,999 (see Chapter 5). When two or more leveling lines are included in a vertical control job, each line must appear as a complete unit in the respective VERT OBS data set, i.e., as a block of records which contains all information pertinent to that line (see table 6-2). Each line must begin with a *10* record, contain any appropriate number of the other types of records in proper sequence, followed by one or more *40 - series records.

TABLE 6-2
STRUCTURE OF THE VERT OBS DATA SET



A leveling line is a unit of field work consisting of a number of survey points (bench marks and temporary bench marks - see Chapter 5) which are connected by chains of differential leveling observations called "runnings." When coded as part of a VERT OBS data set, a leveling line is a block of records comprising record groups arranged in the following order:

1. Line Identification Data (*10*-Series) Records:

- *10* record
- *11* record (optional; possibly *12*, *13*, and *14* records as well)
- *15* records (optional, any number allowed)

2. Survey Equipment Data (*20*-Series) Records:

- *20* records (at least one if instrument not previously reported; in general, one for each previously unreported stadia factor determination) for the first instrument used
- *20* records (at least one if instrument not previously reported; in general, one for each previously unreported stadia factor determination) for the second instrument used
- ::::
- *20* records (at least one if instrument not previously reported; in general, one for each previously unreported stadia factor determination) for the last instrument used
- *21*, *22*, and/or *23* record(s) - *21* record alone if rod not previously reported and no standardization or calibration data are available; in general, one *21* record followed by one or more *22* records (one for each previously unreported rod standardization), one or more *22*, *23*,..., *23* record sets (one such set for each previously unreported single-temperature rod calibration), and/or one or more *23*, *23*,..., *23* record sets (one such set for each previously unreported multiple-temperature rod calibration with one or more *23* record(s) for each calibration temperature) - for the first rod used
- *21*, *22*, and/or *23* record(s) - *21* record alone if rod not previously reported and no standardization or calibration data are available; in general, one *21* record followed by one or more *22* records (one for each previously unreported rod standardization), one or more *22*, *23*,..., *23* record sets (one such set for each previously unreported single-temperature rod calibration), and/or one or more *23*, *23*,..., *23* record sets (one such set for each previously unreported multiple-temperature rod calibration with one or more *23* record(s) for each calibration temperature) - for the second rod used
- ::::
- *21*, *22*, and/or *23* record(s) - *21* record alone if rod not

previously reported and no standardization or calibration data are available; in general, one *21* record followed by one or more *22* records (one for each previously unreported rod standardization), one or more *22*, *23*,..., *23* record sets (one such set for each previously reported single-temperature rod calibration), and/or one or more *23*, *23*,..., *23* record sets (one such set for each previously unreported multiple-temperature rod calibration with one or more *23* record(s) for each calibration temperature) - for the last rod used

Note that for instruments and/or rods which are used in more than one leveling line submitted in the same or in different vertical control jobs, it is not necessary to repeat the same *20*-series records in each such line or each such VERT OBS data set. It is sufficient to submit the respective *20*-series records once as part of the first line submitted in which such instruments and/or rods appear, and thereafter only if the stadia factor is redetermined for an instrument and/or if a rod is restandardized or recalibrated - see SURVEY EQUIPMENT DATA RECORDS.

3. Field Abstract Data (*30*) Records:

30 records - one for the first (starting) survey point (bench mark or temporary bench mark) followed by one *30* record for each elevation carried forward to a survey point along the leveling line.

The order of the *30* records is important; normally they should follow in sequence as the respective survey points (bench marks and temporary bench marks) occur along the leveling line. However, one or more spurs may emanate from any given survey point - in which case, after the *30* record for such a "base" point, the *30* records for all survey points along the longest spur must follow first, then those along the next-longest spur, etc. Only when all spurs emanating from that base point have thus been exhausted, should the *30* record for the elevation carried forward to the next survey point along the main route be given - see example in Figure 6-1.

In the absence of any closed loops, there will be as many *30* records as there are survey points along the leveling line. However, if a loop is closed (as in the case of a spur loop or if the line itself forms a closed loop), an additional *30* record must appear in proper sequence (see above) for the endpoint of every such loop, reflecting the elevation carried forward to that bench mark or temporary bench mark via the loop.

4. Observation Data (*40*-Series) Records:

40 record giving the date, instrument/rod combination, and collimation error data for the first set of runnings
41 record for the first running in the first set
43 record (if needed) for the first running in the first set *
41 record for the second running in the first set
43 record (if needed) for the second running in the first set *
::::
41 record for the last running in the first set
43 record (if needed) for the last running in the first set *
40 record giving the date, instrument/rod combination, and collimation error data for the second set of runnings
41 record for the first running in the second set
43 record (if needed) for the first running in the second set *
41 record for the second running in the second set
43 record (if needed) for the second running in the second set *
::::
41 record for the last running in the second set
43 record (if needed) for the last running in the second set *
::::
40 record giving the data, instrument/rod combination, and collimation error data for the last set of runnings
41 record for the first running in the last set
43 record (if needed) for the first running in the last set *
41 record for the second running in the last set
43 record (if needed) for the second running in the last set *
::::
41 record for the last running in the last set
43 record (if needed) for the last running in the last set *
42 record for the first river/valley crossing along the line
43 record (if needed) for the first river/valley crossing along line *
42 record for the second river/valley crossing along the line
43 record (if needed) for the second river/valley crossing along line *
::::
42 record for the last river/valley crossing along the line
43 record (if needed) for the last river/valley crossing along line *

LINE IDENTIFICATION DATA RECORDS

10 Line Information Record
11 Line Title Record (Optional)
12 Line Title Continuation Record (Optional)
13 Line Title Continuation Record (Optional)
14 Line Title Continuation Record (Optional)
15 Comment Record (Optional)

The line identification data records, bearing the *10*-series data codes, are listed above; the block diagrams illustrating the respective formats will be found under FORMAT DIAGRAMS.

The *10* record contains essential line identification data and is always required. The *11* record is optional; however, it is highly desirable that a line title (reflecting the geographic location of the line - see below) be given. The line title should be concise so as to fit on the *11* record (up to 70 characters); however, one, two, or three continuation records (the *12*, *13*, and *14* records) may be appended if the title is lengthy or if a main title followed by subtitle(s) is called for. Following the *11* record (or else the last title continuation record), there may appear as many *15* records as appropriate to give comments pertinent to the leveling line (e.g., significant problems encountered, deviations from standard procedures, etc.), if any.

The entries on these records (see FORMAT DIAGRAMS) are for the most part self-explanatory; however, the following data items will be explained in greater detail:

Leveling Line: As was stated in the preceding section, a leveling line is a unit of field work consisting of a number of survey points (bench marks and temporary bench marks) which are connected by chains of differential leveling observations called "runnings." Each segment of a leveling line consisting of two neighboring survey points connected by a running is called a "section" of the leveling line.

The objective of differential leveling is the extension of vertical control by precise determination of differences of elevation between successive survey points along the leveling line. The end product is a string of permanently marked vertical control points or bench marks (BMs).

Tolerance Factor: To control the accumulation of error in the differential leveling process, each section of a leveling line is normally "double-run," i.e., observed twice by runnings in opposite directions, and the disagreement between the respective differences of elevation as determined by the two runnings must not exceed a tolerance limit computed as the product of the appropriate tolerance factor and the square root of the section length.

Aside from the units of measurement involved, the numerical value of the tolerance factor used for this purpose depends on the type and intended accuracy of the vertical control survey in question; it is one of the specification parameters which characterizes a given order and class of vertical control survey (see below).

Note that the tolerance factor is expressed in mixed units, i.e., in "Units of Elevation Difference Disagreement Per Square-Root of Units of Section Length." For the purposes of this publication two such unit combinations are allowed (must be specified by the respective units code given as part of the tolerance factor data group on the *10* record):

1. Millimeters per square-root of kilometers (units code MM), and
2. Feet per square-root of statute miles (units code FT).

Order and Class of Survey: A two-digit code is provided on the *10* record to specify the order of accuracy of the survey. The first digit of this code reflects the order and the second digit the class of the survey in accordance with the "Classification, Standards of Accuracy, and General Specifications of Geodetic Control Surveys," prepared by the Federal Geodetic Control Committee (FGCC), and published by the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce, Rockville, MD (February 1974). In addition to the five vertical control survey categories defined in this publication, three other survey categories need to be considered - old vertical control surveys of first or second order for which no class is specified, and surveys of lower-than-third-order accuracy. The respective two-digit codes are as follows:

MM	10 - First-Order (Class Unspecified)
41R	11 - First-Order, Class I
51R	12 - First-Order, Class II
	20 - Second-Order (Class Unspecified)
61R	21 - Second-Order, Class I
81R	22 - Second-Order, Class II
13R	30 - Third-Order
	40 - Lower-Than-Third-Order

The order-and-class code assigned to a leveling line should reflect the procedures and specifications according to which that entire line has been observed. When well-defined segments of a leveling line fall into different order-and-class categories, the line must be divided accordingly and the respective parts submitted as separate lines.

State or Country Code: Provision is made on the *10* record to indicate the political unit(s) and/or geographic area(s) in which the leveling line is located using the two-letter state or country codes given in ANNEX A. Up to three such codes may be entered, in the order of progress along the line in question. In the United States or in Canada, enter the appropriate code for the respective state, commonwealth, province, or territory; elsewhere enter the appropriate code for the respective country, island group, or geographic area - see ANNEX A.

Line Title: The desired elements of information in the title of a leveling line are (1) the respective line number or other identification symbol, (2) the order of accuracy of the survey, (3) whether original leveling or releveling, and (4) the geographic locality (or localities) of the survey. Since the first three elements are explicitly coded on the *10* Line Information Record (see FORMAT DIAGRAMS), it would be superfluous to repeat them in the line title, and hence only the geographic location needs to be specified. The use of geographic location alone as the title of a leveling line has traditionally been the practice of the NGS and its predecessors.

In general, the title by which the leveling line is known to the submitting agency should be given, supplemented to reflect geographic location, as required. Omit punctuation marks (periods, commas, etc.) and parentheses whenever their omission can be tolerated, and use ANNEX A state and country codes whenever reference to a state or country is necessary. Furthermore, edit and/or abbreviate the line title in the interest of fitting the entire title on the *11* Line Title Record, if at all possible. However, up to three additional records (the *12*, *13*, and *14* Line Title Continuation Records) may follow the *11* Line Title Record if the title must be lengthy or when a main title followed by one or more subtitles is desired.

The geographic location of the leveling line should be descriptive of the route followed, i.e., the starting locality, any prominent "via" points, and the ending locality should be specified in the order of progress of the survey (Example: ALBANY GA VIA MORVEN TO CALLAHAN FL). If the leveling line is a member of a special project or of an area network to which a specific name or title has been assigned, such a name or title should be carried as a main title on the *11* record and the title of the line proper should follow as a subtitle on one or more of the continuation records. Example:

11 Record: TULARE-VASCO ARVIN-MARICOPA AREA CA

12 Record: 9.1 KM SE OF KETTLEMAN CITY TO PIXLEY

DATE AND TIME

Date of the VERT OBS data set creation must appear on the Data Set Identification Record, and the dates on which survey operations commenced and terminated are to be entered on the *10* Line Information Record. In addition, character fields are reserved for the date and/or time on several other records of the VERT OBS data set. Throughout the VERT OBS data set, date and time are to be coded as follows:

Date: Full date is coded as an eight-digit integer number consisting of four two-digit groups denoting (from left to right) the last whole century, number of full years since the turn of century, month of the year, and day of the month (CCYYMMDD). For the 20th

century, the "century" columns may be omitted, and the date coded as a six-digit integer number denoting the year, month, and day (YYMMDD). If the day is not known (e.g., in connection with old data extracted from archives for which the date is not fully specified), leave the last two columns of the field blank; if the month is not known, leave the last four columns of the field blank. For example, February 8, 1970, would be coded as follows:

1. Full date is known: 19700208 or 700208
2. Day of the month is not known: 197002 or 7002
3. Month of the year is not known: 1970 or 70

Time: The time of day is coded as a four-digit integer number consisting of two two-digit groups denoting (from left to right) the hours and minutes (HHMM) of a 24-hour clock. Each four-character time field or pair of (beginning and ending) time fields is preceded by a one-character field reserved for the appropriate one-letter U.S. Navy time zone designation (see below). In every case, the local zone time is to be used; in this manner ambiguities are avoided concerning the date, which is always assumed to be the "local" date (i.e., the date changes at local midnight).

Time Zone: A time zone is a geographic region in which uniform time differing by an integer number of hours from Greenwich Mean Time (GMT) is maintained by law. In theory, a time zone extends 7-1/2 degrees in longitude east and west of a "time meridian" whose longitude is a multiple of 15 degrees (since the Earth rotates 360 degrees in 24 hours, 15 degrees of longitude difference equals one hour of time difference). In practice, the lines which separate adjacent time zones often follow political boundaries and are therefore irregular. Associated with every time zone is a "time zone description" - an integer number positive west of Greenwich and negative east of Greenwich - which represents the number of hours which must be added (algebraically) to the local zone time in order to obtain the corresponding GMT. The time zone description is reduced by one hour when the standard zone time is changed to daylight-saving time.

Instead of the numeric time zone description, it is more convenient to use the U.S. Navy one-letter codes which uniquely identify each time zone. In this system, GMT is the "Z" (Zulu) Time Zone. Time zones east of Greenwich are identified by letters A, B, C, etc., through L, with the letter J omitted. Time zones west of Greenwich are identified by letters N, O, P, etc., through X. The letter Y is used to designate the western half of the time zone centered on the meridian of longitude 180 degrees (International Date Line), and the letter M is used to designate the eastern half of this zone.

The world-wide use of the time zone descriptions and the U.S. Navy one-letter designations is illustrated in ANNEX H. In the continental

United States, Alaska (AK), and Hawaii (HI) the time zones are as given in Table 6-3:

TABLE 6-3 - U.S. NAVY TIME ZONE DESIGNATIONS

<u>STANDARD TIME</u>	<u>DAYLIGHT TIME</u>	<u>TIME</u>	<u>TIME ZONE</u>	<u>U.S. NAVY</u>		
		<u>MERIDIAN</u>	<u>DESCRIP'N</u>	<u>DESIGNATION</u>		
Atlantic	AST	Eastern	EDT	60W	+4	Q (Quebec)
Eastern	EST	Central	CDT	75W	+5	R (Romeo)
Central	CST	Mountain	MDT	90W	+6	S (Sierra)
Mountain	MST	Pacific	PDT	105W	+7	T (Tango)
Pacific	PST	Yukon	YDT	120W	+8	U (Uniform)
Yukon	YST	AK/HI	HDT	135W	+9	V (Victor)
AK/HI	HST	Bering	BDT	150W	+10	W (Whiskey)

If the time zone cannot be reliably ascertained, leave the time zone field blank. In this case, the time given will be interpreted as the standard time in a zone determined on the basis of the longitude of the vertical control point from which the respective leveling observations (running) originate.

SURVEY EQUIPMENT DATA RECORDS

- *20* Instrument Information Record
- *21* Rod Information Record
- *22* Rod Standardization Record
- *23* Rod Calibration Record

The survey equipment data records, identified by *20*-series data codes, are listed above; the block diagrams illustrating the respective formats are given in the FORMAT DIAGRAMS. The survey equipment data records contain identification and calibration data pertaining to the leveling instruments and rods used to carry out the differential leveling observations. See STRUCTURE OF THE VERT OBS DATA SET for the proper sequence in which the *20*-series records must appear in the block of records which constitutes a leveling line in a VERT OBS data set.

The *20* Instrument Information Record contains the data required to identify a leveling instrument (the appropriate NGS survey equipment code and the instrument serial number), date of stadia factor determination, and the stadia factor itself. This stadia factor will be used in the computation of the lengths of sights made with that instrument subsequent to the respective stadia factor determination date. Several *20* records may be submitted as a group for a leveling instrument; one for each past stadia factor determination.

The *21* Rod Information Record contains analogous data (the appropriate NGS survey equipment code and the rod serial number) required to identify a leveling rod; however, it does not contain any calibration data. Rod calibration data, which are required only for rods used in first- and second-order differential leveling work, must follow the *21* record in the form of a *22* record, a record set consisting of a *22* record and one or more *23* record(s), or a record set consisting of two or more *23* records, all bearing the same standardization/calibration date.

Again, several such *22* records, *22*, *23*,..., *23* record sets, and/or record sets of the form *23*, *23*,..., *23*, as appropriate, may be submitted as a group for a leveling rod following the respective *21* Rod Information Record; one such *22* record, *22*, *23*,..., *23* record set, or *23*, *23*,..., *23* record set for each past calibration of the leveling rod in question.

The *22* Rod Standardization Record contains the summary of a rod calibration. For the purposes of this chapter, the term "standardization" will be used to denote a group of data which is the end product of a rod calibration (i.e., the respective coefficient of thermal expansion, rod excess, and index error - see below). The *22* Rod Standardization Record may appear alone, or it may be followed by one or more *23* Rod Calibration Record(s) containing the (single-temperature) calibration data on which the standardization summary is based. Optionally, a *22* record may also precede a set of two or more *23* records of a multiple-temperature calibration; in this case, however, all data contained on the leading *22* record are inferable from the accompanying *23* records.

The *23* Rod Calibration Record contains data pertaining to the calibration of a leveling rod at one temperature. For single-temperature calibrations, submit one or more *23* record(s) following the corresponding *22* record (see above) - as many as required to accommodate all calibration intervals (three per *23* record - see FORMAT DIAGRAMS). For multiple-temperature calibrations, submit a set of *23* records (one or more per calibration temperature), with or without a preceding *22* record, which is optional in this case. In general, *23* Rod Calibration Records should be submitted whenever the respective data are available.

NGS Leveling Instrument and Rod File: The purpose of the *20*-series records is to provide input to a permanent computer file in which a historic record is maintained for each leveling instrument and leveling rod ever used in a VERT OBS data set submitted to the National Geodetic Survey. A record is established in this file for an instrument or rod at the first time it is encountered in the processing of a VERT OBS data set. Thereafter, the file is updated by adding new information to the respective instrument and/or rod records whenever

standardization or calibration data not previously available are encountered among the *20*-series records of a subsequently processed leveling line in the same or different VERT OBS data set.

Accordingly, it is not necessary to repeat identical *20* Instrument Information Records among the *20*-series records of every leveling line in which that instrument appears. It is sufficient, for any instrument, to submit one or more such records (one for each past determination of the respective stadia factor) once initially, and thereafter only when a new stadia factor is determined (e.g., following the installation of a new reticle). Of course, for each leveling line, care must be taken to insure that any omitted *20* Instrument Information Records have previously been made available for inclusion in the NGS Leveling Instrument and Rod File.

Analogously, it is not necessary to repeat identical *21* Rod Information Records, *22* Rod Standardization Records, and/or *23* Rod Calibration Records among the *20*-series records of every leveling line in which the respective rod appears. It is sufficient, for any rod, to submit an appropriate grouping of these records (covering all past calibrations) only once initially, and thereafter only when the leveling rod in question is recalibrated. Again, in connection with every leveling line, care must be taken to insure that any omitted *21*, *22*, and/or *23* records have previously been made available for inclusion in the NGS Leveling Instrument and Rod File.

To summarize, submit a *20* record for every previously unreported leveling instrument and/or previously unreported stadia factor determination. For every leveling rod, submit a *21* record alone if the rod has not previously been reported and no calibration data follow (e.g., a rod used in third- or lower-order differential leveling work exclusively). Otherwise, submit (as a group) one *21* record followed by one or more *22* records, one or more *22*, *23*,..., *23* record sets, and/or one or more *23*, *23*,..., *23* record sets, as appropriate; one such *22* record, *22*, *23*,..., *23* record set, or *23*, *23*,..., *23* record set for each previously unreported calibration of the leveling rod in question.

NGS Survey Equipment Code: A three-digit numeric identification code assigned to each category of survey equipment, and within each category to specific instruments or other commonly used items. In particular, leveling instruments are assigned 200-series survey equipment codes, while leveling rods and staves are assigned 300-series survey equipment codes (see ANNEX F).

Instrument/Rod Serial Number: Assigned by the manufacturer, the serial number is the ultimate identifier of a specific leveling instrument or leveling rod. Serial numbers are normally numeric;

however, alphabetic characters are often used as prefixes, suffixes, etc., and special characters such as a blank (space), hyphen (minus sign), slash (solidus), etc., may appear imbedded in the respective alphanumeric character group. For this reason, a serial number must be treated as alphanumeric information to be entered in the respective character field left-justified and blank-filled on the right.

The instrument or rod serial number will be used together with the respective survey equipment code (see above) to create appropriate entries in the NGS Leveling Instrument and Rod File, to maintain these entries up to date, and to access this file for the retrieval of the respective stadia factor and/or rod calibration data in the course of routine processing of VERT OBS data sets. It is therefore of utmost importance that the respective serial number be faithfully reproduced as given by the manufacturer, character for character, including any leading zeros, imbedded blanks, etc., and that identical serial number representation be used consistently whenever reference is made to that specific instrument or rod in any VERT OBS data set.

Stadia Factor: An instrument-specific constant numerically equal to the ratio of the focal length of the instrument to the respective stadia interval, i.e., to the distance which separates the stadia lines (two horizontal lines spaced equally above and below the level line) in the reticle of the leveling instrument. By design, the stadia interval is chosen so that the stadia factor is a convenient integer number such as 100.

The stadia factor is used to obtain the distance between the leveling instrument and a rod as the product of the stadia factor multiplied by the respective (full) stadia intercept - see OBSERVATION DATA RECORDS. Note that a sight length so obtained is in the same units as the stadia intercept, i.e., in rod units, and hence must be further multiplied by a conversion factor to obtain the sight length in other units.

Rod Units: The units in which the respective rod scale is graduated. Four different rod units are acceptable, each identified by a two-letter code. They are as follows:

CF - centifeet (0.01 ft)
CM - centimeters (0.01 m = 1 cm)
CY - centiyards (0.01 yd = 0.03 ft)
HC - half-centimeters (0.005 m = 0.5 cm = 5 mm)

Rod Graduation Code: A one-digit code denoting the type of graduation of the respective leveling rod:

1 - line graduation (single scale)
2 - line graduation (double scale)
3 - block graduation (including checkerboard)
4 - other

Temperature Scale: The temperature at which the leveling rod was calibrated must be given on both the *22* Rod Standardization Record (Standardization Temperature) and the *23* Rod Calibration Record (Calibration Temperature). On either record, provision is made to indicate which of the two possible temperature scales applies by means of a one-letter code immediately preceding the respective temperature field:

- C - Celsius Temperature Scale
- F - Fahrenheit Temperature Scale

Coefficient of Expansion: The relative change in linear dimension (expansion or contraction) per unit of temperature change peculiar to the material of the respective leveling rod scale (these include INVAR or other low-expansion metal alloys for modern rods, and specially treated wood for rods used in older differential leveling work of high precision). Aside from the scale factor 10,000 mentioned below, the coefficient of expansion given on the *22* Rod Standardization Record must be in units which are compatible with the respective temperature scale and rod units (see above), as specified in Table 6-4.

TABLE 6-4
UNITS OF COEFFICIENT OF EXPANSION

ROD UNITS	TEMPERATURE SCALE	
	C	F
CF	feet per degree Celsius	feet per degree Fahrenheit
CM	meters per degree Celsius	meters per degree Fahrenheit
CY	feet per degree Celsius	feet per degree Fahrenheit
HC	meters per degree Celsius	meters per degree Fahrenheit

The coefficient of expansion expressed in either one of the four possible unit combinations (see above) is always a very small decimal fraction. To avoid the keying of a long string of zeros preceding the first significant digit, enter the respective coefficient of expansion multiplied by 10,000, i.e., with the decimal point moved four places to the right (Example: A coefficient of expansion of 0.00000079 is entered as 0.0079 or .0079).

A-Flag: Enter 'A' if the coefficient of expansion (see above) is an "assumed" value (i.e., as given by the manufacturer, or a standard value for the material in question). Leave the field blank if the coefficient of expansion has been determined by means of a multiple-temperature calibration of the respective leveling rod.

Rod Excess: A factor used to compute the rod correction for a single running of a section of a leveling line. The rod calibration process precisely determines the actual length of the respective rod (or of a representative segment thereof). Rod excess is the ratio of the difference between the actual and nominal length (actual minus nominal) to the nominal length of the rod (or calibrated segment thereof).

Note that the rod excess is a unitless number; however, since it is always a small (positive or negative) decimal fraction, it is convenient to express rod excess as the aforementioned ratio multiplied by 1,000 (i.e., as millimeters per meter, if metric units are being used). Accordingly, regardless of the respective rod units, enter the rod excess with the decimal point moved three places to the right.

Index Error: The distance above or below the bottom surface (foot) of the leveling rod at which the nominal origin (zero) of the respective graduated scale is located (the origin of the low scale of a rod with a double-scale graduation). The index error is positive when the scale origin falls below the foot of the rod; it is negative when the scale origin falls above the foot of the rod. Note that the index error is expressed in rod units (see above) of the leveling rod in question.

FIELD ABSTRACT DATA RECORDS

30 Field Abstract Record

The purpose of the *30* record is to provide cross-reference between the primary identifier (i.e., the designation) of a vertical control point and the corresponding job-specific survey point serial number (SPSN). In addition, the accumulated distance along the leveling line and the respective "field" elevation (see below) are given on this record. Following established practice, these latter two data items are computed from the detailed differential leveling field notes as the work progresses and are normally recorded on a form called the "Field Abstract" - hence the name "Field Abstract Record." The block diagram illustrating the respective format will be found with the FORMAT DIAGRAMS.

Submit a *30* record for the first (starting) survey point (bench mark or temporary bench mark), followed by a *30* record for each elevation carried forward to a survey point by the differential leveling process. Normally, in the absence of any closed loops, there will be as many

30 records as there are survey points along the leveling line. However, if a loop is closed (as in the case of a spur loop or if the line itself forms a closed loop), an additional *30* record must appear in proper sequence (see below) for the endpoint of each such loop, reflecting the elevation carried forward to that bench mark or temporary bench mark via the loop.

Order of the *30* Records: As was previously covered in the section on the STRUCTURE OF THE VERT OBS DATA SET, the order of the *30* records is crucial. This is because the *30* records, as a group, define the leveling line in question, i.e., they define the nominal sequence of bench marks and temporary bench marks along the leveling line.

Normally, the *30* records should follow the same sequence as the respective survey points occur along the leveling line. However, one or more spurs may emanate from any survey point - in which case, after the *30* record for such a "base" point, the *30* records for all survey points along the longest spur must follow first, then those along the next-longest spur, etc. Only when all spurs emanating from that base point have thus been exhausted should the *30* record for the elevation carried forward to the next survey point along the main route of the leveling line be given - see example in Figure 6-1.

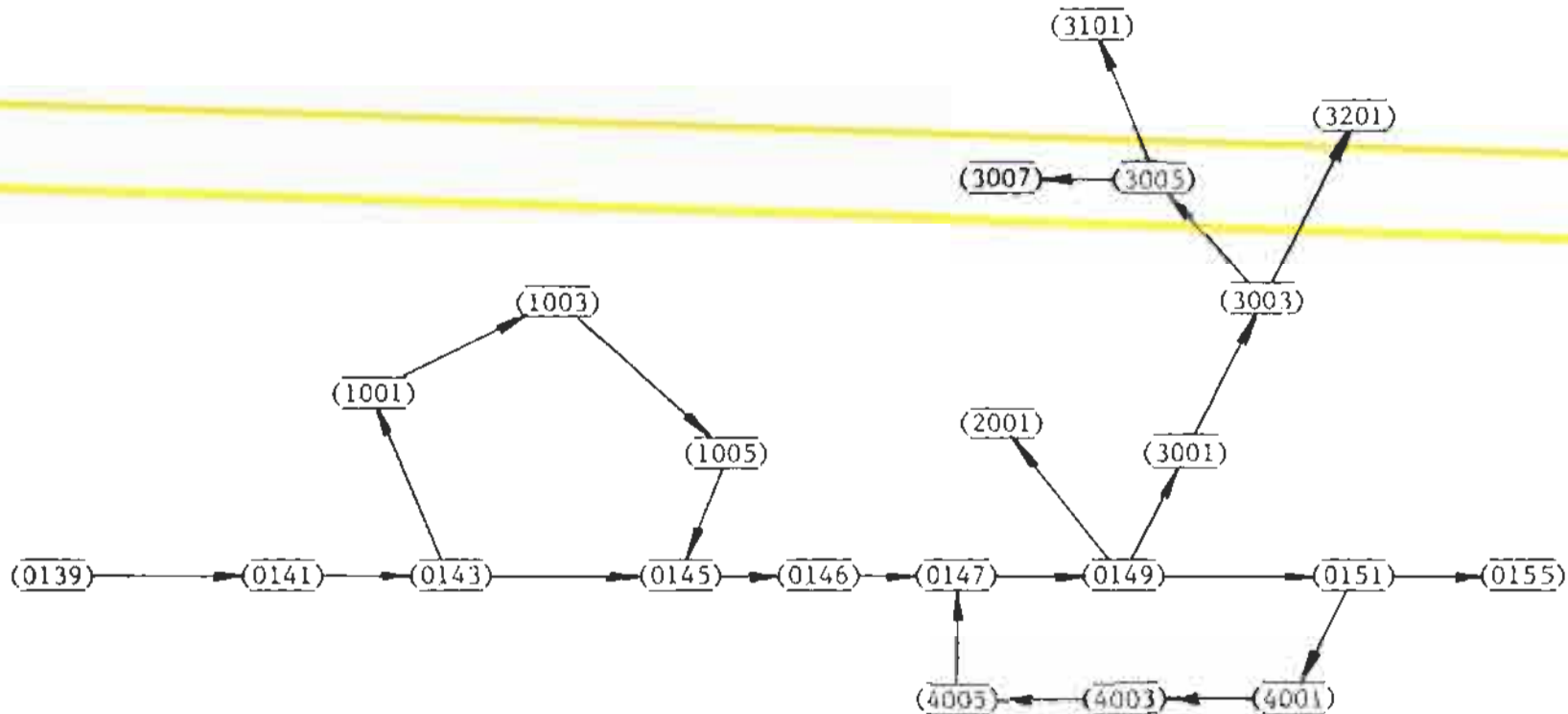
Survey Point Serial Number: For the purpose of identifying the initial and terminal points of each section of the leveling line in a concise and unique manner (e.g., on the respective *41* and *42* records - see OBSERVATION DATA RECORDS), each survey point that is leveled to in a vertical control job (bench mark or temporary bench mark) is assigned a job-specific serial number in the range 0001 to 9999. All survey points for which recovery descriptions are written, but which were not leveled to in the current project, are to be assigned the SPSN code 0000. See Chapter 5 for a detailed explanation of the survey point numbering system.

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The survey point serial number (SPSN) is also used in the correlation of the data pertaining to the bench marks and temporary bench marks which appear in the VERT OBS data set with the corresponding descriptive data contained in the companion VERT DESC data set of the vertical control job. For this reason, special care must be taken to insure that the identical survey point serial number assigned to a bench mark or temporary bench mark in the VERT OBS data set is also used to identify the same survey point in the respective companion VERT DESC data set.

Designation: A vertical control point or bench mark is normally identified by a numeric or alphanumeric symbol which is stamped on the disk marker (or is otherwise inscribed on the bench mark monument) to which is appended the abbreviation or acronym (see Annex C) of the agency whose name is precast in the monument - if other than the

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Sequence of the *30* Records:

1. 0139	5. 1003	9. 0146	13. 3003	17. 3201	21. 4003
2. 0141	6. 1005	10. 0147	14. 3005	18. 2001	22. 4005
3. 0143	7. 0145	11. 0149	15. 3101	19. 0151	23. 0147
4. 1001	8. 0145	12. 3001	16. 3007	20. 4001	24. 0155

FIGURE 6-1 - Example of Field Abstract Record sequence.

National Geodetic Survey, National Ocean Survey, or Coast and Geodetic Survey (see Origin). For marks not having a precast agency name, append the acronym or abbreviation of the agency which set the mark (see Setting-by-Agency). If the agency cannot be determined, do not append an agency acronym or abbreviation. Less frequently, a bench mark is assigned a concise, intelligible name (e.g., when a horizontal control point also becomes a bench mark); the appropriate acronym or abbreviation should be appended to these also. A maximum of 25 characters (including all imbedded blanks) is allowed.

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In every case, the bench mark designation entered on the *30* record must be identical to the (primary) designation used to identify the same vertical control point in the companion VERT DESC data set of the vertical control job - refer to Chapter 7. Use the same general guidelines for the designations of any survey points which lack descriptive data (e.g., undescribed temporary bench marks which may have to be carried in the VERT OBS data set but which do not appear in the companion VERT DESC data set).

Accumulated Distance: The distance covered by the differential leveling operation from the nominal starting point of the leveling line to the survey point in question. It is obtained by successively adding the lengths of the intervening sections (following the line-order conventions used for the ordering of the *30* records in the case of a survey point located on a spur or leveled to via a spur loop - see Order of the *30* Records). Recall that "section" is a segment of the leveling line consisting of two neighboring survey points connected by a chain of differential leveling observations (i.e., connected by a "running").

The individual section lengths are obtained by accumulating the lengths of the backsight and foresight of each setup of the respective running, which in turn are usually obtained as a function of the corresponding stadia intercepts (see Stadia under OBSERVATION DATA RECORDS) and the stadia factor of the leveling instrument used. For this purpose, use the minimum section length if more than one running has been made over a section, as is the normal case.

The accumulated distance (as well as the field elevation - see below) is carried on the *30* record to provide a check against certain undetected keying errors, line order errors, errors in the assignment of survey point serial numbers, etc. For this reason, the accumulated distance entered in this field must be the value which is normally computed and "abstracted" in the course of the differential leveling operation. In particular, the accumulated distance must not be generated (e.g., by software) from the respective *41* and *42* records (see OBSERVATION DATA RECORDS), as this would defeat the purpose for which it is intended.

Field Elevation: The approximate elevation of the survey point in question is obtained as the (algebraic) sum of the elevation of the starting point of the leveling line and the raw (i.e., uncorrected) elevation differences determined for the intervening sections (following the line-order conventions used for the ordering of the *30* records in the case of a survey point located on a spur or leveled to via a spur loop - see Order of the *30* Records). (Recall that a "section" is a segment of the leveling line consisting of two neighboring survey points connected by a chain of differential leveling observations referred to as a "running.")

The end product of every running over a section of the leveling line is the respective observed, uncorrected elevation difference (see Elevation Difference under OBSERVATION DATA RECORDS). When more than one running has been made over a section, as is the normal case, a "section mean" must be computed using all forward and backward runnings made over that section which have passed appropriate field rejection criteria.

Noting that a backward running produces an elevation difference of opposite sign, the respective section mean is defined as the algebraic difference between the sum of elevation differences determined by forward runnings and the sum of elevation differences determined by backward runnings divided by the number of runnings. In other words, if ΣF is the sum of all acceptable forward-running elevation differences, and ΣB is the sum of all acceptable backward-running elevation differences, the desired section mean is $(\Sigma F - \Sigma B)/n$, where n is the number of runnings.

The field elevation (as well as the accumulated distance - see above) is carried on the *30* record to provide a check against certain undetected keying errors, line order errors, errors in the assignment of survey point serial numbers, etc. For this reason, the field elevation entered in this field must be the value which is normally computed and "abstracted" in the course of the differential leveling operation. In particular, the field elevation must not be generated (e.g., by software) from the respective *41* and *42* records (see OBSERVATION DATA RECORDS), as this would defeat the purpose for which it is intended.

OBSERVATION DATA RECORDS

- *40* Survey Equipment Record
- *41* Running Record
- *42* River/Valley Crossing Record
- *43* Correction/Rejection Record

*

The observation data records, identified by *40*-series data codes, are listed above; the block diagrams illustrating the respective formats are given in the FORMAT DIAGRAMS. The purpose of the *40*-series

records is to provide the means to record the differential leveling observations carried out along a leveling line. Recall that a leveling line is a unit of field work consisting of a number of survey points (bench marks and temporary bench marks) connected by differential leveling observations, and that "section" is a segment of the leveling line consisting of two neighboring survey points which are connected by one or more differential leveling observations.

The differential leveling observations carried out over a section of leveling line are of two basic types - runnings and crossings - see below.

Normally, the (observed) elevation difference between the endpoints of a section is determined as the accumulation of a continuous series of small elevation difference measurements, each obtained as the difference between the respective backsight and foresight readings on a pair of leveling rods positioned vertically over "turning points" at a relatively short sight distance from the leveling instrument. This type of differential leveling observation which consists of a chain of small elevation difference measurements (i.e., leveling instrument "setups") is called a "running."

When carried out in the nominal direction of progress of the leveling line, it is called a "forward" running; when carried out in the opposite direction, it is called a "backward" running. A section which is "double-run" (as is the normal case) will have at least one forward and one backward running (among possibly several runnings in either direction) which meet field acceptance criteria (i.e., the disagreement between the respective observed elevation differences does not exceed the tolerance which is in effect for the order and class of the vertical survey in question).

Submit a *41* record for every running carried out along the leveling line, regardless of its field acceptance or rejection status (rejected runnings may be brought within the respective tolerance after various corrections are applied in the course of subsequent data processing). The *41* records must be submitted in sets consisting of a *40* record followed by one or more *41* records - one for each running made on the same date, using the same leveling instrument and the same leveling rods, and subject to the same level collimation error (see below) as specified in the respective leading *40* record - see STRUCTURE OF THE VERT OBS DATA SET.

The other type of differential leveling observation is the "river/valley crossing" (or "crossing") which is used when a gap larger than the maximum allowable sight length of a setup must be spanned, as when a river (or dry canyon) must be crossed without using a suitable bridge. This type of differential leveling observation is the result of a series of reciprocal measurements carried out simultaneously from both sides of

such a gap using special "valley-crossing" equipment. Note that each individual river/valley crossing must be treated as a separate section of the leveling line.

Submit a *42* record for every river/valley crossing along the leveling line. The *42* records, if any, must appear as the last group of records of the respective leveling line block in the VERT OBS data set (see STRUCTURE OF THE VERT OBS DATA SET).

Submit a *43* record for each running or river/valley crossing for which a refraction correction was determined from temperature profile measurements made by field personnel, or for which a rod correction was determined using detailed rod calibrations furnished by the National Bureau of Standards. Also, if a running or river/valley crossing was rejected, include a *43* record indicating the source of the rejection (field or office). Each required *43* record should immediately follow its corresponding *41* or *42* record. *

Level Collimation Error: The (small) angle by which the line of sight defined by the horizontal crossline in the reticle of a leveling instrument departs from the actual level surface when the instrument is "leveled": positive when the line of sight deviates upward, and negative when the line of sight deviates downward from the level surface. The collimation error is due to a small misalignment of the respective bubble vial (in the case of spirit-level instruments) or compensator mechanism (in the case of self-aligning instruments).

The level collimation error can be resolved into two components--a residual constant component (which can be minimized by careful adjustment of the instrument) and a variable component which is caused by transient deformation of the structural parts of the instrument brought about by stresses and strains due to uneven temperature distribution (differential heating) and other intermittent physical forces which are active in the course of the daily handling of the leveling instrument.

Because of the unpredictable nature of the intermittent component, the level collimation error must be determined at sufficiently frequent intervals to permit the application of meaningful corrections to the respective leveling rod readings. Note that the effect of the collimation error cancels for a setup with backsight and foresight of equal length; it is the total accumulated length imbalance between all the backsights and foresights of a running to which the correction for collimation error is applicable.

Tangent of Collimation Error: The observing procedure by means of which the collimation error is determined (commonly known as the "C-Test") produces the ratio of the corresponding rod reading error to the length of line of sight, i.e., the trigonometric function tangent of the collimation error.

Note that the tangent of an angle is a unitless number; however, since it is a very small (positive or negative) decimal fraction, it is convenient to use the tangent of collimation error multiplied by 1000 (i.e., as millimeters per meter, if the metric units are being used). Accordingly, enter the tangent of collimation error with the decimal point moved three places to the right.

Wind Code: A one-character numeric code, the purpose of which is to denote the approximate wind conditions prevailing during the course of the running. The three wind codes are:

- 0 - wind speed less than 10 kilometers per hour
- 1 - wind speed from 10 to 25 kilometers per hour
- 2 - wind speed greater than 25 kilometers per hour

Sun Code: A one-character numeric code, the purpose of which is to denote the approximate conditions of insolation prevailing during the course of the running. The three sun codes are:

- 0 - less than 25% of setups under sunny conditions
- 1 - 25% to 75% of setups under sunny conditions
- 2 - more than 75% of setups under sunny conditions

Stadia, Stadia Intercept, and Stadia Intercept Code: Stadia is a method of obtaining the approximate distance (typically to the nearest 0.1 meter) between the leveling instrument and a vertically positioned leveling rod as the product of the instrument's stadia factor (as specified in the corresponding *20* record) and the respective stadia intercept - the difference between the high and low stadia line readings on the respective rod. Recall that stadia lines are two horizontal lines spaced equally above and below the horizontal crossline in the reticle of the leveling instrument. Note that the distance obtained in this manner is in the same units as the stadia intercept, i.e., in rod units of the respective leveling rod (as specified in the corresponding *21* record).

For differential leveling observations, stadia information is desired (1) to compute the total length of the running, and (2) to compute the total accumulated length imbalance between the backsights and foresights of the running (to eliminate the residual effect of collimation error - see Level Collimation Error above). Because of the latter requirement, two fields are provided for the entry of stadia information, one for the Sum of Backsight Stadia Intercepts and the other for the Sum of Foresight Stadia Intercepts.

As was mentioned previously, the two stadia lines are equidistant from the horizontal crossline (level line) of the leveling instrument. The use of full stadia intercepts requires the observation and recording of two rod readings (the stadia high and the stadia low readings) in

addition to the level line reading. It is possible to observe only one stadia line reading (either the stadia high or the stadia low) in addition to the level line reading, in which case half stadia intercepts are obtained. Note that either full stadia intercepts or half intercepts must be observed consistently throughout a running. To specify which one of the two possible procedures has been followed, provision is made on the *41* record for a one-letter Stadia Intercept Code:

F - full stadia intercepts observed
H - half stadia intercepts observed

Units: A set of two-letter codes for the various units of length in which the length of running (*41* record), length of crossing (*42* record), and elevation difference (*41* and *42* records) may be given. It is the same set of unit codes which is used on the *30* record to denote the units of accumulated distance and field elevation - see FIELD ABSTRACT DATA RECORDS. The specific unit codes are:

MT - meters KM - kilometers
FT - feet KF - kilofeet
YD - yards SM - statute miles

Running Length: The overall length of the running (i.e., the distance covered by the differential leveling observations), preceded by the respective units code, only if the stadia information (see above) is not available; otherwise leave blank.

Crossing Length: Enter the overall length of the crossing (i.e., the distance spanned by the river/valley crossing observations), preceded by the respective units code.

Elevation Difference: Enter the observed difference of elevation as determined by the running or crossing in question, preceded by the respective units code. Note that this must be the raw observed elevation difference, i.e., the result of the running or crossing observations to which no corrections have been applied.

FORMAT DIAGRAMS

For each record which appears in a VERT OBS data set (see Table 6-1), a block diagram has been prepared to illustrate the respective format. These "format diagrams" have been designed to fulfill the following objectives:

1. Each record is 80 characters long (standard punched card image).
2. Each record has a fixed format, i.e., every data field has a specific length and specific position within the record.

3. Each format diagram is a graphic image of the respective record.
4. Within the limits of available space, information and instructions concerning the data item to be entered in each data field are provided on the format diagrams to render them self-explanatory.
5. When appropriate, sample entries are shown in the data entry line of each format diagram.
6. Each data field is characterized as to its type by a string of lower-case characters which appear immediately below the data entry line.

Data Field Types:

1. Alpha Field (aa...a) - intended for a data item which is coded as a string of alphabetic, numeric, and/or special characters, with or without imbedded blanks, to be entered into the respective data field left-justified and blank-filled on the right. See Chapter 5 for a list of special characters which are allowed.

2. Blank Field (bb...b) - to be blank-filled. Data fields which are designated as blank fields must be left blank, i.e., no data items may be entered in these fields.

3. Constant (Numeric) Field (cc...c) - intended for a data item which is a number (i.e., an integer, a proper or improper fraction, or a decimal fraction) coded as a string of numeric characters (prefixed with a minus sign if the number is negative) which may contain one leading or imbedded (but not trailing) decimal point if it is a decimal fraction, or an imbedded hyphen and/or slash if it is a proper or improper (mixed) fraction such as $3/4$, $5-1/2$, etc., to be entered into the respective data field left-justified and blank-filled on the right.

4. Floating-Point Field (ff...fdd...d) - intended for a data item which is coded as a decimal number, i.e., as a string of numeric characters (prefixed with a minus sign if the number is negative) which may not contain any imbedded blanks. If the decimal point is present, the character string representing the integer digits, the decimal point, and the decimal fraction digits may be positioned anywhere within the respective field (generally left-justified), and the unused columns of the data field are blank-filled.

When the decimal point is not coded, the "f" portion of the floating-point field is to contain the integer part of the decimal number, and the "d" portion the corresponding decimal fraction part,

the decimal point being implied between the rightmost "f" column and the leftmost "d" column of the field.

Accordingly, a string of numeric characters representing m integer digits followed by n decimal fraction digits with the decimal point absent must be positioned in the floating-point field in such a manner that its integer part falls into the m rightmost "f" columns, and its decimal fraction part into the n leftmost "d" columns, with any unused columns of the data field being blank-filled. When a negative number is entered, code the minus sign immediately preceding the leading digit.

5. Integer Field (ii...i) - intended for a data item which is coded as a string of numeric characters representing a positive or negative integer number, to be entered into the respective data field right-justified. In the case of a positive integer number, zero-fill any unused columns on the left. In the case of a negative integer number, code the minus sign immediately preceding the leftmost non-zero digit, and blank-fill any unused columns to the left of the minus sign.

6. Specific Character Field (ss...s) - intended to contain a specific alphabetic, numeric, special character, or a specific group of characters. Every "s" column of a specific character field must contain the character shown in that position in the data line of the respective format diagram.

Required Data: In general, only those records which are applicable to the data at hand should be included in a VERT OBS data set (e.g., no *42* records need be submitted if there are no river/valley crossings along the respective leveling line). The character fields intended for data items which are essential have been shaded on the format diagrams; if applicable to the data being coded, these character fields must be in accordance with the instructions given on the respective format diagrams or in the text of this chapter. Records which are optional or those which may be omitted under certain circumstances are clearly designated in the headings, footnotes, or bodies of the corresponding format diagrams.

Data Set Identification Record. This must be the first record of every data set submitted. A data set may be submitted either as a deck of cards or as a magnetic tape file containing formatted records. Magnetic tape is preferred; use punched cards for small, isolated jobs only.

000000000111111111112222222223333333334444444555555566666667777777778
 1234567890123456789012345678901234567890123456789012345678901234567890

<p><u>Date Data Set Created</u> (e.g. date this record keyed) Century, year, month, day (CCYYMMDD). If day is unknown, leave last two columns blank. If month is unknown, leave last four columns blank.</p>		19780510
<p><u>Name of Submitting Agency or Firm</u></p>		
<p><u>Full Name</u></p>		
<p><u>Abbreviation</u> - must be unique. Enter the symbol listed in ANNEX C. See footnote for other agencies or firms</p>		US GEOLOGICAL SURVEY
<p><u>Data Set Identification</u></p>	<p><u>Data Type</u> - OBS for field observation data.</p>	OBS
	<p><u>Data Class</u> - VERT for vertical control data.</p>	VERT
	<p><u>Job Code</u> - preceded and followed by asterisk.</p>	CX
<p><u>Sequence Number</u> - must be 000010 on this record. Increment by 10 on successive records to allow for insertions.</p>		000010

iiiiisaaasssssssaaaaa
 00000000111111111111222222233333344444455555566666677777778
 123456789012345678901234567890123456789012345678901234567890

Important: To insure uniqueness, agencies or firms not listed in ANNEX C must have their proposed abbreviation symbol accepted by NGS prior to first submittal of data - see ANNEX K.

10 Line Information Record. This must be the leading record of each leveling line included in the job - note that a VERT OBS job consists of one or more leveling lines. A code is provided to indicate whether the survey is an original leveling or a releveling of the line - see footnotes.

0000000001	1111112222	2222223333	3333334444	44445555	55556666	66667777	77778888	88889999	9999	1 = single or double - simultaneous run 2 = double run																																																			
1234567890	1234567890	1234567890	1234567890	1234567890	1234567890	1234567890	1234567890	1234567890	1234567890																																																				
<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th colspan="10">ORDER AND CLASS OF SURVEY</th> </tr> <tr> <th>ORDER</th> <th colspan="3">1st</th> <th colspan="3">2nd</th> <th>3rd</th> <th colspan="2">LOWER</th> </tr> <tr> <th>CLASS</th> <th>*</th> <th>I</th> <th>II</th> <th>*</th> <th>I</th> <th>II</th> <th>**</th> <th colspan="2">**</th> </tr> <tr> <th>CODE</th> <td>10</td> <td>11</td> <td>12</td> <td>20</td> <td>21</td> <td>22</td> <td>30</td> <td colspan="2">40</td> </tr> </thead> <tbody> <tr> <td colspan="11">*Class unspecified **No class subdivision</td> </tr> </tbody></table>											ORDER AND CLASS OF SURVEY										ORDER	1st			2nd			3rd	LOWER		CLASS	*	I	II	*	I	II	**	**		CODE	10	11	12	20	21	22	30	40		*Class unspecified **No class subdivision										
ORDER AND CLASS OF SURVEY																																																													
ORDER	1st			2nd			3rd	LOWER																																																					
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*Class unspecified **No class subdivision																																																													
Agency which made the observations. For agencies or firms listed in ANNEX C, enter the respective six-character abbreviation. For others, enter the full or abbreviated name (up to 20 characters) - see ANNEX C for examples.																																																													
Initials of Chief of Party - i.e., person responsible for the survey; leave blank if unknown.																																																													
State or Country Code - see ANNEX A. Enter the code(s) for the state (or country) in which the leveling line begins (and into which it extends).																																																													
Order and Class of Survey - see table above.																																																													
Tolerance Factor used to compute maximum disagreement allowed for each double-run section of the line - see footnote.								Factor																																																					
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Date Field Operations Commenced Century, year, month, day (CCYYMMDD). If day is unknown, leave last two columns blank. If month is unknown, leave last four columns blank.																																																													
Releveling Code - see footnote.																																																													
Agency-specific pointer to its own archives - usually given as an "accession number" (or other cataloguing symbol) which identifies the block of data, possibly supplemented by a further "line" or "part" designation.						Line/Part																																																							
						Accession Number																																																							
Data Code - preceded and followed by asterisk. (*10* - Line Information Record)																																																													
Sequence Number Increment by 10 on successive records to allow for insertions.																																																													

1111112222333333444455556666777788889999
 1234567890123456789012345678901234567890
 CS NGS
 1969111019700608MM1.0
 10*122024
 1111112222333333444455556666777788889999
 1234567890123456789012345678901234567890
 Releveling Code: Enter R if releveling over previously established line; leave blank otherwise.
 Units (of Tolerance Factor): MM - mm/square-root of km, FT - feet/square-root of statute miles.

11 Line Title Record (Optional) and *12*,*13*,*14* Line Title Continuation Records (Optional).
 Use the *11* record to give the title of the line (or of area network or special project of which the line is a part) and the *12*,*13*,*14* records for continuation and/or subtitles, if any.

00000000111111112222222233333333444444445555555566666666777777778888888899999999
 1234567890123456789012345678901234567890123456789012345678901234567890

Line Title - use *12*,*13*,*14* Line Title Continuation Record(s) as required if the title exceeds 70 characters or if subtitles are necessary (e.g. the title of an area network followed by title of the line).

The title of a leveling line should be descriptive of the route followed, i.e., it should indicate the starting and ending locations and prominent "via" points, if any (Example: ALBANY GA VIA MORVEN TO CALLAHAN FL).

Do not divide words (or other character groups) between the *11*,*12*,*13*,*14* Line Title and Line Title Continuation Records. Omit punctuation marks (periods, commas, etc.) and parentheses whenever possible. Use ANNEX A state and country codes whenever reference to a state or country is necessary.

Abbreviate and/or edit a line title in the interest of fitting the entire title on the *11* Line Title Record, if possible.

Data Code
 (*11*,*12*,*13*,*14* Line Title Records)

Sequence Number
 Increment by 10 on successive records to allow for insertions.

nnnnn*11*FULARE-VASCO ARVIN-MARICOPA AREA CA
 nnnnn*12*9.1 KM SE OF KETTLEMAN CITY TO PIXLEY
 iiiiisiiii
 00000000111111112222222233333333444444445555555566666666777777778888888899999999
 1234567890123456789012345678901234567890123456789012345678901234567890

15 Comment Record (Optional). Use this record for any comments pertinent to the leveling line. If the comment(s) exceed 70 characters, use another *15* record for continuation; any number of *15* records is allowed. Do not divide words between consecutive *15* records.

00000000011111112222222222333333333344444444445555555555666666666677777777778
 12345678901234567890123456789012345678901234567890123456789012345678901234567890

Comment
Data Code (*15* - Comment Record)
Sequence Number Increment by 10 on successive records to allow for insertions.
mnnnnr*15*GRAVITY SURVEY OBSERVED OVER THIS LINE. iiiiisaa 00000000011111112222222222333333333344444444445555555555666666666677777777778 1234567890123456789012345678901234567890123456789012345678901234567890

20 Instrument Information Record. Submit this record for every instrument (identified by the respective Survey Equipment Code and Instrument Serial Number) once for each past stadia factor determination (to form historical file) and when a new stadia factor is determined - see footnote.

00000000	11111111	22222222	33333333	33344444	44445555	55566666	66677777	7778	Stadia Factor - instrument-specific number which multiplied by Stadia Intercept gives dist to rod.
12345678	901234	567890	123456	789012	345678	901234	567890	1234567890	Date Determined - year, month, day (YYMMDD). If day is unknown, leave last two columns blank. If month is unknown, leave last four columns blank.
Agency which owns or has the custody of the instrument.									
For agencies or firms listed in ANNEX C, enter the respective six-character abbreviation. For others, enter the full or abbreviated name (up to 20 characters) - see ANNEX C for examples.									
Model or Type - examples: FISHER N-3 NK3-M NI1 NI-002									
Manufacturer - examples: USC+GS WILD KERN ZEISS/OBERKOCHEN ZEISS/JENA K+E HILGER-WATTS									
Instrument Serial Number - alphanumeric, left-justified.									
NGS Survey Equipment Code - see ANNEX F.									
Data Code (*20* - Instrument Information Record)									
Sequence Number Increment by 10 on successive records to allow for insertions.									

Note: Omit for those instruments for which *20* record(s) containing identical information have been given in another line of this data set - or in a previously submitted VERT OBS data set.

23 Rod Calibration Record. In addition to the respective *22* record, submit one or more *23* records for every past single- and multiple-temperature calibration of the rod for which the data are available and when recalibrated (NOT REQUIRED FOR 3RD AND LOWER ORDER) - see footnote.

0000000001111111222222333333333333344444445555556666667777777778	For each interval, specify the point on the rod (XXX in rod units) at which the calibration measurement starts, the point at which it ends, and the measured length of the respective interval (Xxxxxx in feet, meters, or yards - as per Units of Measured Length).	INTERVAL 1	INTERVAL 2	INTERVAL 3
12345678901234567890123456789012345678901234567890		Measured Length - in feet, meters, or yards (see Units of Measured Length); decimal point implied after column 47. <u>Ending Point in rod units.</u> <u>Starting Point in rod units.</u>	Measured Length - in feet, meters, or yards (see Units of Measured Length); decimal point implied after column 60. <u>Ending Point in rod units.</u> <u>Starting Point in rod units.</u>	Measured Length - in feet, meters, or yards (see Units of Measured Length); decimal point implied after column 73. <u>Ending Point in rod units.</u> <u>Starting Point in rod units.</u>
		Units of Measured Length (FT, MT, or YD).	Units of Measured Length (FT, MT, or YD).	Units of Measured Length (FT, MT, or YD).
		Calibration Temperature	Calibration Temperature	Calibration Temperature
	Scale - C-Celsius, F-Fahrenheit.	Scale - C-Celsius, F-Fahrenheit.	Scale - C-Celsius, F-Fahrenheit.	Scale - C-Celsius, F-Fahrenheit.
	Date of Calibration - year, month, day (YYMMDD). If day is unknown, leave last two columns blank. If month is unknown, leave last four columns blank.	Date of Calibration - year, month, day (YYMMDD). If day is unknown, leave last two columns blank. If month is unknown, leave last four columns blank.	Date of Calibration - year, month, day (YYMMDD). If day is unknown, leave last two columns blank. If month is unknown, leave last four columns blank.	Date of Calibration - year, month, day (YYMMDD). If day is unknown, leave last two columns blank. If month is unknown, leave last four columns blank.
	Laboratory or other source of calibration - see ANNEX C. Enter MAKER if furnished by the manufacturer.	Laboratory or other source of calibration - see ANNEX C. Enter MAKER if furnished by the manufacturer.	Laboratory or other source of calibration - see ANNEX C. Enter MAKER if furnished by the manufacturer.	Laboratory or other source of calibration - see ANNEX C. Enter MAKER if furnished by the manufacturer.
	Rod Serial Number - alphanumeric, left-justified.	Rod Serial Number - alphanumeric, left-justified.	Rod Serial Number - alphanumeric, left-justified.	Rod Serial Number - alphanumeric, left-justified.
	NGS Survey Equipment Code - see ANNEX F.	NGS Survey Equipment Code - see ANNEX F.	NGS Survey Equipment Code - see ANNEX F.	NGS Survey Equipment Code - see ANNEX F.
	Data Code (*23* - Rod Calibration Record)	Data Code (*23* - Rod Calibration Record)	Data Code (*23* - Rod Calibration Record)	Data Code (*23* - Rod Calibration Record)
	Sequence Number Increment by 10 on successive records to allow for insertions.	Sequence Number Increment by 10 on successive records to allow for insertions.	Sequence Number Increment by 10 on successive records to allow for insertions.	Sequence Number Increment by 10 on successive records to allow for insertions.

Note: Omit for those rods for which *22* and/or *23* record(s) containing identical data have been given in another line of this data set - or in a previously submitted VERT OBS data set.

30 Field Abstract Record. Submit this record for the first (starting) survey point (bench mark or temporary bench mark) and thereafter for each elevation carried forward (possibly more than once for any given survey point) in the order of occurrence along the leveling line - see text.

000000000111111122222222223333333333444444444455555555556666666666777777777788888888889999999999
 12345678901234567890123456789012345678901234567890123456789012345678901234567890

<p>Important: Data items hereunder must be keyed from the Field Abstract and not generated from the respective *41*/#42* records - see text.</p>	
<p>Accumulated Distance</p>	<p>Field Elevation</p>
<p>Units - see footnote.</p>	<p>Field Elevation - see text. Enter left-justified and key the decimal point. Prefix minus sign if applicable.</p>
<p>Accumulated Distance - see text. Enter left-justified and key the decimal point.</p>	<p>Units - MT, FT, or YD.</p>
<p>Designation - must not exceed 25 characters.</p> <p>This is the primary designation which will be associated with the vertical control point for publication purposes. In every case, the designation must be edited in conformity with <u>Guidelines for Survey Point Names and Designations (ANNEX D)</u>.</p> <p>The designation entered in this field must be identical (character for character) with the designation given for the same point in the corresponding VERT DESC data set.</p>	
<p>Survey Point Serial Number (SPSN) - see Chapter 5. Must be same as SPSN used in VERT DESC data set.</p>	
<p>Data Code (*30* - Field Abstract Record)</p>	
<p>Sequence Number</p> <p>Increment by 10 on successive records to allow for insertions.</p>	

nnnnn*30*0187D 1056 KM23.49 MM57.11702
 iiiiisiiiiiaaaaaaaaaaaaaaaaaa cccccccca ccccccccc
 0000000011111112222222223333333333444444444455555555556666666666777777777788888888889999999999
 123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

Units: MT - meters FT - feet YD - yards
 KM - kilometers KF - kilofeet SM - statute miles

40 Survey Equipment Record. Submit this record at the start of every day's work and whenever an item of survey equipment changes and/or the collimation error is redetermined, to be followed by one or more *41* records for the runnings to which data on the *40* record are applicable.

INSTRUMENT	ROD 1	ROD 2
M-Flag - M if micrometer used, blank otherwise.	Rod Serial Number - alphanumeric, left-justified. Must be identical to the serial number given on the corresponding *21* record	Rod Serial Number - alphanumeric, left-justified. Must be identical to the serial number given on the corresponding *21* record
Instrument Serial Number - alphanumeric, left-justified. Must be identical to the serial number given on the corresponding *20* record.	NGS Survey Equipment Code - see ANNEX F.	NGS Survey Equipment Code - see ANNEX F.
Date of Running(s) - year, month, day (YYMMDD). If day is unknown, leave last two columns blank. If month is unknown, leave last four columns blank.		
Data Code (*40* - Survey Equipment Record)		
Sequence Number Increment by 10 on successive records to allow for insertions.		
Tangent of Collimation Error x1000 (i.e., enter with decimal point moved three places to the right) - see text. Leave blank if none determined.		
Time of Collimation Error Determination		
Local Time - hours and minutes (HHMM).		
Time Zone - see ANNEX H.		
NOTE - Collimation error data are not required for 3rd- and lower-order differential leveling.		

Important: This must be the leading record of every *40*, *41*, *42*, *43*, *44*, *45* set containing runnings made on the same date using the same equipment and affected by the same collimation error.

43 Correction/Rejection Record. Submit this record for each running or river/valley crossing when 1) temperature profiles were measured in the field, 2) a rod correction can be determined using detailed rod calibrations furnished by the National Bureau of Standards, or 3) the running or river/valley crossing is to be rejected.

0000000001	1111111111	2222222222	2333333333	3333444444	4444444455	5555555555	5555555555	5555555555
1234567890	1234567890	1234567890	1234567890	1234567890	1234567890	1234567890	1234567890	1234567890
Sequence Number Increment by 10 on successive records to allow for insertions.								
Data Code - preceded and followed by asterisk (*43* - Refraction Correction or Rejection Record)								
Date of Running or River/Valley Crossing - year, month, day (YYMMDD)								
Starting Survey Point Serial Number (SPSN)								
Ending Survey Point Serial Number (SPSN)								
Starting Time of Running or River/Valley Crossing								
Refraction Correction in mm. Enter left-justified and key the decimal point.								
Field/Office Rejection - see note above.								
Rod Correction in mm. Enter left-justified and key the decimal point.								
Temperature scale C - Celsius F - Fahrenheit								
Mean temperature for upper probe								
Mean temperature for lower probe								
Note - Field/Office Rejection Codes: F = Field rejection O = Office rejection ∅ = not rejected								
nnnnnr	*43*	790914	012201	231452	-1.21	-0.81	C19.1	20.1
iiiiis	iiii	iiii	iiii	iiii	iiii	iiii	iiii	iiii
0000000001	111111	111111	222222	233333	333333	333344	444444	555555
1234567890	123456	789012	345678	901234	567890	123456	789012	345678
1234567890	123456	789012	345678	901234	567890	123456	789012	345678

Data Set Termination Record. This must be the last record of every data set submitted.

00000000011111111122222222333333334444444455555555666666667777777788888888
 1234567890123456789012345678901234567890123456789012345678901234567890

Data Set Structure: A VERT OBS Data Set consists of one or more leveling lines.

Data Set Identification Record	
10-series records *20*-series records (if any) *30* records *40*-series records	FIRST LINE
10-series records *20*-series records (if any) *30* records *40*-series records	SECOND LINE
:::: ::::	:::: ::::
10-series records *20*-series records (if any) *30* records *40*-series records	LAST LINE
Data Set Termination Record	

Job Code - preceded and followed by asterisk.

Sequence Number
Increment by 10 on successive records to allow for insertions.

iiiiiiii
 iiiiisaas
 00000000011111111122222222333333334444444455555555666666667777777788888888
 1234567890123456789012345678901234567890123456789012345678901234567890

Chapter 7

VERTICAL DESCRIPTIVE (VERT DESC) DATA

INTRODUCTION

The purpose of this chapter is to provide detailed specifications and instructions for the coding and keying of the descriptive data set of a vertical control job. This data set contains original descriptions and/or recovery descriptions pertaining to bench marks which occur in one or more leveling projects contained in the vertical control job.

VERT DESC DATA SET RECORDS

The data which constitute a VERT DESC data set are organized into four categories:

1. Bench Mark Identification and Location Data
2. Monumentation, Recovery, and Stamping Data
3. General Descriptive Text
4. Optional Partially Coded Descriptive Text

Within these categories, the respective data have been grouped into one or more logical units called "records." A record is a string of characters containing data coded according to a specific format. Every record in a VERT DESC data set consists of 80 characters or "columns" (standard punched card image). Within each record, the 80 columns are divided into fixed-length "character fields," each field being the space reserved for a specified data item. Accordingly, for every desired data item, there exists a field of appropriate length into which the data item in question is to be entered after it is converted into a string of alphanumeric characters. The set of rules according to which specific data items are converted into strings of alphanumeric characters to be entered in the fields of a record is known as the "format" of that record.

TABLE 7-1

VERTICAL DESCRIPTIVE DATA SET RECORDS

FIRST RECORD

aa - Data Set Identification Record

BENCH MARK IDENTIFICATION AND LOCATION DATA

10, *11*, *12* - Bench Mark Identification Record

13, *14* - Bench Mark Designation Record

15 - Alias Record

16 - Area Record

17, *18* - Nearest-City-or-Town Record

MONUMENTATION, RECOVERY, AND STAMPING DATA

- *20*, *21*, *22* - Setting-by-Agency Record
- *23*, *24*, *25* - Recovery-by-Agency Record
- *26*, *27* - Setting and Monumentation Record
- *28* - Stamping Record

*

GENERAL DESCRIPTIVE TEXT

- *30* - Descriptive Text Record

OPTIONAL PARTIALLY CODED DESCRIPTIVE TEXT

- *40* - Concrete Post Record (Optional)
- *41* - Rod/Pipe Record (Optional)
- *42* - Vertical Reference Record (Optional)
- *43* - Witness Post Record (Optional)

LAST RECORD

- *aa* - Data Set Termination Record

Note: The symbol "aa" denotes the two-character job code assigned by the submitting agency - see Chapter 5.

The types of records which may appear in a VERT DESC data set are listed in Table 7-1. Each type of record has been given a name, and a block diagram illustrating the respective format has been prepared to serve as a model for that record - see FORMAT DIAGRAMS.

The first character field of every record (columns 1-6) is reserved for the respective record sequence number - see Chapter 5. Except for the first and last records of the data set, the second character field of each record (columns 7-10) contains a two-digit numerical data code, preceded and followed by an asterisk, which specifies the type record (*10*, *13*, ..., *43* - see Table 7-1). On some of the records, more than one such data code appears in other fixed positions (i.e., columns 46-49 and 73-76) to serve as labels for important data items to be entered immediately following the respective data codes.

The first and last records of the data set (the Data Set Identification Record and the Data Set Termination Record) display the two-character alphanumeric job code, preceded and followed by an asterisk, in the field normally occupied by the first data code (columns 7-10). This job code is assigned sequentially (*A1*, *A2*, ..., *ZZ* - see Chapter 5) by the submitting agency.

STRUCTURE OF THE VERT DESC DATA SET

The first record of a VERT DESC data set must be the Data Set Identification Record which contains the required information to

identify the data set and to correlate it with its companion VERT OBS (or VERT ELEV) data set, i.e., the job code, data type (VERT DESC), name of submitting agency, and date the data set was created. The last record of the data set must be the Data Set Termination Record. It is the only other record in the data set in which the respective job code appears in the same field (columns 7-10) as on the Data Set Identification Record.

Between these two delimiting records, the descriptive data submitted in the VERT DESC data set must be organized as one or more blocks, each containing the original description and/or one or more recovery descriptions which pertain to the same vertical control point. See Chapter 5 for the definition of Survey Point Serial Number (SPSN). *

For descriptive data extracted from archives, each bench mark block of a VERT DESC data set should contain the original description or the oldest recovery description on file, followed by all subsequent recovery descriptions for that bench mark in chronological order. For descriptive data submitted at the completion of a leveling project, each bench mark block will normally contain one original description if the bench mark is a new vertical control point, or else one recovery description if the bench mark is a previously established vertical control point which was recovered in the course of the leveling project. The overall structure of the VERT DESC data set is shown in Table 7-2 below.

TABLE 7-2 - STRUCTURE OF THE VERT DESC DATA SET

Data Set Identification Record		
Original or Recovery Description	(if any)	First Bench Mark
Subsequent Recovery Description		
Subsequent Recovery Description		
Original or Recovery Description	(if any)	Second Bench Mark
Subsequent Recovery Description		
Subsequent Recovery Description		
::::		::::
::::		::::
Original or Recovery Description	(if any)	Last Bench Mark
Subsequent Recovery Description		
Subsequent Recovery Description		
Data Set Termination Description		

TABLE 7-3

RECORD SEQUENCE IN THE ORIGINAL OR RECOVERY DESCRIPTION OF A BENCH MARK

10, *11*, *12*	Bench Mark Identification Record	
13, *14*	Bench Mark Designation Record	
15		
:::	Alias Record(s) - at most three allowed - omit if no alias	
15		
16	Area Record - omit if not applicable	
17, *18*	Nearest-City-or-Town Record	
20, *21*, *22*	Setting-by-Agency Record - optional in recovery desc	*
23, *24*, *25*	Recovery-by-Agency Record - recovery description only	
26, *27*	Setting and Monumentation Record - *26* is optional in recovery description	
28	Stamping Record - required in original and recovery description if *27* Monumentation Code is C, D, F, or P.	
30		
30		
30	Descriptive Text Record(s) - one paragraph of descriptive text	
:::		
30		

OPTIONAL PARTIALLY CODED DESCRIPTIVE TEXT RECORDS

(Use in lieu of std phrases at the end of text paragraph)

40	Concrete Post Record OR *41* Rod/Pipe Record
42	Vertical Reference Record - if applicable
43	Witness Post Record - if applicable

NOTE: Numeric distance estimates or measurements in original or recovery descriptions of vertical control points may be given in either English or metric units. However, when values are given in metric units, English equivalencies are to follow in parentheses. This applies to all *18* and *30* records. Figure 7-2 includes properly written *18* and *30* records.

Original Description: An original bench mark description is a document which is normally prepared for every vertical control point when it is monumented. The purpose of the bench mark description is to provide, in a concise and standardized manner, all pertinent information which may be necessary or useful to locate, positively identify, and/or utilize the vertical control point in question - see example in Figure 7-1.

In addition to the respective identification, monumentation, and stamping data, a bench mark description normally contains a one-paragraph narrative section which gives specific directions how the

bench mark may be reached from a readily locatable landmark such as a public building in a nearby town or the crossroads of prominent highways, and pinpoints the location of the bench mark in terms of distance and direction (point of compass) from one or more reference objects in the immediate vicinity.

The narrative section should also describe in detail the mark or monument itself, provide vertical reference by pointing out that the bench mark is a certain distance above, below, or about level with a nearby reference object (if applicable), and should give the distance and direction (point of compass) to the bench mark from a witness post, if one has been set in the immediate vicinity. Optional partially coded descriptive text records (*40*, *41*, *42*, and *43* records - see Table 7-3) have been provided for use in lieu of standard phrases fulfilling these latter requirements.

Recovery Description: Similar in form to an original description, a recovery description is a document normally prepared for every previously established vertical control point which is "recovered" - i.e., either included in a leveling project or just visited and inspected. Aside from recovered vertical control points, recovery descriptions should also be prepared for other types of previously monumented survey points (e.g., horizontal control points) which are leveled to and hence established as vertical control points. The purpose of the recovery description is to provide a statement about the condition of the respective mark or monument, and to update, supplement, or correct the original description and/or previous recovery description(s) - see example in Figure 7-2.

A recovery description differs from an original description in two aspects. First, the Recovery-by-Agency Record must be present, either in place of or in addition to the Setting-by-Agency Record which is optional. Second, the narrative section of a recovery description may be limited to just the statement "RECOVERED AS DESCRIBED." - or it may be omitted altogether if the Condition Code entered as data item *25* on the Recovery-by-Agency Record (see MONUMENTATION, RECOVERY, AND STAMPING DATA RECORDS) is sufficient to convey the status of the bench mark in question. However, for every vertical control point which is recovered in usable condition, a complete new narrative section should be given whenever sufficient changes have taken place in its vicinity to render a previous description inadequate.

Combined Set: When one or more recovery descriptions are submitted in addition to the original description or leading recovery description in a bench mark block of a VERT DESC data set (e.g., when multiple descriptive data are extracted from archives for the same vertical control point), all recovery descriptions which follow the original description or the leading recovery description may start with the *23*, *24*, *25* Recovery-by-Agency Record (i.e, data items *10* through

BENCH MARK DESCRIPTION

*10*SPNO-0419, INC CODE- R, APPROX LAT-3021 03N, APPROX LONG-091 0646W *11*QUAD-N50091213, QSN-1, *12*ZONE-112
 *13*DESIGNATION-KLV 197 *14*STATE CODE/COUNTY-LA, EAST BATON ROUGE
 (PARISH in Louisiana - State CENSUS DIVISION in Alaska)
 *15*ALIAS-327 25
 *16*AREA-
 *17*NEAREST CITY OR TOWN-BURTSVILLE DISTANCE AND DIRECTION FROM *18*NEAREST CITY OR TOWN-3.9 KM (1.5 MI) NW
 *19*CODE/SETTING BY AGENCY-1.1.66S *21*YEAR-1965 CHIEF OF PARTY-NLM *22*OTHER CONTROL-
 *23*CODE/RECOVERY BY AGENCY-1.1.N6S *24*YEAR-1976 CHIEF OF PARTY-RRG *25*CONDITION OF MARK-G
 *26*CODE/SETTING CLASSIFICATION-12.1
 *27*REPRESENTATION-D DISK TYPE-DL, QUALITY OVERRIDE-1, ORIGIN-N6S
 *28*STANDING-KLV 197 1965 230.695 FT

ORIGINAL OR RECOVERY DESCRIPTIVE TEXT

RECOVERED IN GOOD CONDITION. THE WITNESS POST WAS RELOCATED THIS DATE. NEW DESCRIPTION FOLLOWS. ABOUT 3.9 KM (1.5 MI) NORTHWEST ALONG STATE HIGHWAY 327 FROM THE JUNCTION WITH STATE HIGHWAY 30, AT THE JUNCTION OF A GRAVEL ROAD LEADING NORTH, 23.5 METERS (77 FT) NORTH OF THE CENTERLINE OF THE HIGHWAY, 7.9 METERS (26 FT) EAST OF THE CENTERLINE OF THE GRAVEL ROAD, 7.5 METERS (31 FT) SOUTH OF A POWER LINE ROAD, 0.4 METERS (1.3 FT) WEST OF A FENCE LINE.

(Units M = English/N = metric) A DISK SET INTO THE TOP OF A CONCRETE POST P-F FLUSH WITH THE GROUND/P-PROJECTING/R-RECESSED, 10. IN/CM
 41(Units M, Setting Code, same as in *26*) REPIPE DRIVEN TO THE DEPTH OF, FT/M, IN A SLEEVE EXTENDING TO THE DEPTH OF, FT/M (leave preceding entry blank if no sleeve), GROUND IN A PIPE, P-F FLUSH WITH THE GROUND/P-PROJECTING/R-RECESSED, IN/CM
 42(Units M,) 0.5 FT/M A-ABOVE/B-BELOW/L-ABOUT LEVEL WITH (Units and FT/M blank if 'L') THE HIGHWAY
 43(Units M) 3.6 FT/M, (Point of Compass) FROM A WITNESS POST - also specify object, (start entry with article (a, an, the) if applicable)

Figure 7-2 - Example of Coded Recovery Description

22 may be omitted). Such a combined set consisting of a complete leading element (original or recovery description) followed by one or more abridged subsequent recovery descriptions must be flagged by the DRC Code "C" on the Bench Mark Identification Record of the leading element - see BENCH MARK IDENTIFICATION AND LOCATION DATA RECORDS.

BENCH MARK IDENTIFICATION AND LOCATION DATA RECORDS

- *10*, *11*, *12* Bench Mark Identification Record
- *13*, *14* Bench Mark Designation Record
- *15* Alias Record
- *16* Area Record
- *17*, *18* Nearest-City-or-Town Record

The bench mark identification and location data records, bearing the *10*-series data codes, are listed above; the block diagrams illustrating the respective formats will be found in the FORMAT DIAGRAMS section. More than one data code appears in these records (see the respective format diagrams) to serve as labels for important data items and thereby to facilitate the extracting and coding of these data items from the source documents. The data items to be entered in these records are explained in detail below.

Survey Point Serial Number: Whether submitted as MODE 1 data (VERT OBS and VERT DESC data sets) or MODE 2 data (VERT ELEV and VERT DESC data sets), the data contained in a vertical control job (see Chapter 5) pertain to a set of survey points, each of which must be properly identified. To this end, every survey point that is leveled to in a vertical control job is assigned a four-digit survey point serial number (SPSN) in the range 0001 through 9999 to serve as a unique identifier of the respective survey point within that vertical control job - see Chapter 5 (JOB CODE AND SURVEY POINT NUMBERING). All survey points for which recovery descriptions are written in this vertical control job, but which are not leveled to in this vertical control job, will be assigned the SPSN code 0000.

*
*
*
*

The survey point serial number is the vital link by means of which data pertaining to the same survey point in either the VERT OBS and VERT DESC data sets (MODE 1 data) or the VERT ELEV and VERT DESC data sets (MODE 2 data) are positively correlated prior to their entry into the National Geodetic Survey Data Base. For this reason, the same survey point serial number must be consistently used to identify the same control point in either the OBS, DESC, or ELEV data sets of a vertical control job. In particular, the survey point serial number assigned to a bench mark in the VERT DESC data set must be the same as that used to identify the same vertical control point in the companion VERT OBS (or VERT ELEV) data set.

DRC Code: This is a one-letter code which is used to identify the descriptive data as to its type. It is assigned as follows:

- D - Self-standing original description.
- R - Self-standing recovery description.
- C - Combined set consisting of one complete original description or recovery description followed by any number of subsequent recovery descriptions for the same vertical control point in which data items *10* through *22* have been omitted.

Position: The (approximate) geodetic latitude and longitude of the vertical control point must be specified so that (1) the appropriate Quad Identifier (see below) may be assigned to it, and (2) the appropriate gravity information may be obtained for use in the processing of the associated observations and/or in the determination of geopotential numbers and orthometric heights for network adjustment and vertical control data publication purposes.

If no other source is available, the vertical control point should be carefully plotted on the largest-scale topographic map available, and the respective latitude and longitude extracted therefrom (to the nearest second).

Junction Code: This is a one-letter code reserved to identify only the most important junction marks of the National network, the junction marks of Basic Net A. To identify such a mark, enter a J in column 45 of the *10* record. The J code is to be used only by NGS personnel, or after obtaining instruction from NGS.

*
*
*
*
*

Quad Identifier (QID): The primary indexing and identification system adopted by the National Geodetic Survey Data Base for all horizontal and vertical control points is based on 1° x 1° "quads" defined by integer-degree latitude and longitude gridlines (parallels and meridians), and on the successive quadrantal sub-division of the basic 1° x 1° quads into 30' x 30' quads, 15' x 15' quads, and 7-1/2' x 7-1/2' quads accomplished by successive halving of the latitude and longitude gridline interval. The respective quad identifier (QID) is a nine-character symbol coded as HLLWWWABC, where:

- H - Hemisphere (N or 0 for northern, S or 1 for southern)
- LL - Latitude of SE corner of the 1° x 1° quad (00°-89°N, 01°-90°S)
- WWW - Longitude of SE corner of the 1° x 1° quad (000°-359°W)
- A - 30' subdivision indicator (1-NE, 2-SE, 3-SW, 4-NW subquad)
- B - 15' subdivision indicator (1-NE, 2-SE, 3-SW, 4-NW subquad)
- C - 7 1/2' subdivision indicator (1-NE, 2-SE, 3-SW, 4-NW subquad)
(A,B,C = 0 or blank indicates no further subdivision)

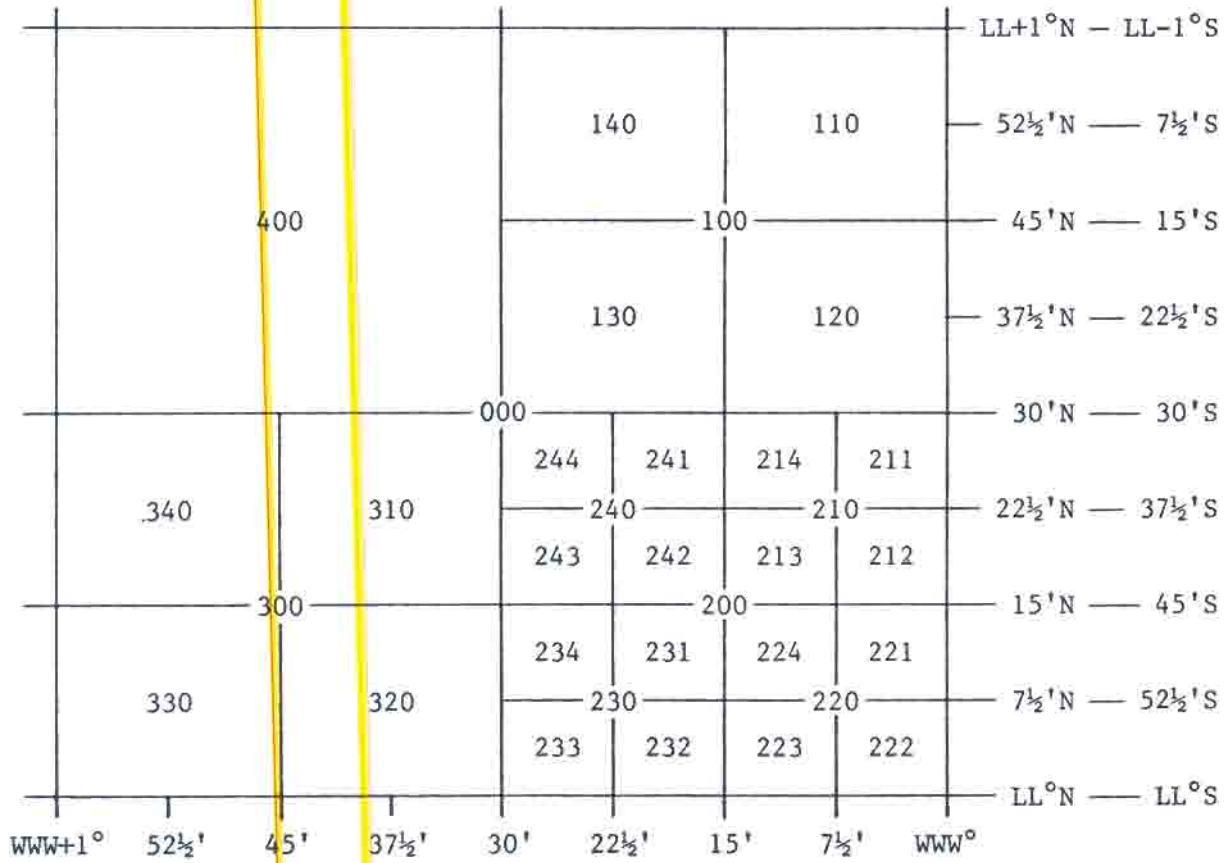


FIGURE 7-3 - Successive quadrantal subdivision of the 1°x1° quad.

On the Bench Mark Identification Record of a recovery description for a vertical control point whose QID has been published as part of the respective original description and/or previous recovery description, enter the quad identifier exactly as published. For a vertical control point without previously published quad identifier or whose quad identifier is unknown, determine the QID (at least to the nearest 30' x 30' subquad) from the (approximate) geodetic position - see Position.

Quad Station Number (QSN): To distinguish among horizontal and vertical control points which share the same quad identifier, every control point is assigned a sequential quad station number (QSN) which is unique within the respective quad. The National Geodetic Survey Data Base has been designed to index both horizontal and vertical control points at the 7-1/2' x 7-1/2' quad level, with four-digit quad station numbers starting with 0001 (i.e., 0001, 0002, 0003, etc.) assigned sequentially to the control points (both horizontal and vertical) which fall into the same 7-1/2' x 7-1/2' quad.

Since the QSN is assigned by NGS, it follows that this data item can be entered only on the Bench Mark Identification Record of a recovery description, and then only for a vertical control point whose QSN has been published by the NGS as part of the respective original description and/or previous recovery description. Whenever it is known, enter the 7-1/2' x 7-1/2' quad station number assigned by the National Geodetic Survey Data Base; otherwise leave the QSN field blank.

Line Identifier: A NGS-specific number of the leveling within each 30' x 30' quad to which the bench mark in question belongs (for NGS use only).

Designation: The bench mark or vertical control point designation is the primary identifier by means of which the vertical control point is known to the general public. A maximum of 25 characters (including all imbedded blanks) are allowed for a bench mark designation to be entered as the *13* data item in the *13*, *14* Bench Mark Designation Records.

A vertical control point or bench mark (BM) is normally identified by a number or by an alphanumeric symbol which is usually stamped on the respective disk marker (or otherwise inscribed on the bench mark monument) to which is appended the abbreviation or acronym (see Annex C) of the agency whose name is precast on the monument - if other than NGS, NOS, or C&GS. For marks not having a precast agency name, append the acronym or abbreviation of the agency which set the mark. If the agency cannot be determined, do not append an agency acronym or abbreviation. Less frequently, a bench mark is assigned a concise, intelligible name (e.g., when a horizontal control point also becomes a bench mark); the appropriate agency acronym or abbreviation should be appended to these also.

In principle, the designation by means of which a vertical control point is identified for publication purposes should closely resemble the designation which actually appears on the respective marker; however, extraneous information is frequently present which is not desired to be included as part of the designation of the bench mark in question. *

For example, the designation of a bench mark should not include the penalty warning, etc., which is normally precast on the respective survey marker (however, an abbreviation or acronym denoting the agency whose name is precast on the vertical control point - if other than the NGS, NOS, or C&GS - should be appended to the designation - see ANNEX C and ANNEX D). If an agency name is not precast on a mark, but the name of the agency which set the mark can be determined, append the agency's acronym or abbreviation to the designation. Also, the designation of a bench mark should not include the elevation which may have been stamped on the respective survey marker (except in the case of a bench mark for which the stamped elevation is the only identifier available), and it should not normally include the "year-mark-set" (except for bench marks which have been reset - see Reset Marks below and ANNEX D). *

For automatic data processing purposes, the use of designations as primary bench mark identifiers poses some difficulty in that exactly the same spelling, editing, and/or abbreviation of the respective designation must be used whenever a reference is made to the same vertical control point in computer-readable media. To this end, a set of guidelines has been assembled in ANNEX D (GUIDELINES FOR SURVEY POINT NAMES AND DESIGNATIONS) for the purpose of standardizing the designations of vertical control points. Accordingly, every bench mark designation must be edited in conformity with the "VERTICAL CONTROL POINTS" section of ANNEX D at the time it is placed in computer-readable form, and special effort must be made to use the same edited version of the respective bench mark designation throughout the vertical control job, i.e., in the companion VERT OBS or VERT ELEV data set as well as in the VERT DESC data set.

Except for the abbreviation and/or editing which may be required, the designation of a vertical control point to be entered as data item *13* on the *13*, *14* Bench Mark Identification Record should be taken exactly as it appears on the original description and/or subsequent recovery descriptions, if any. However, awkward abbreviations, misspellings, or any other obvious defects detected in a previously published bench mark designation should be corrected. Parentheses are not permitted to appear in a bench mark designation, and other special characters such as periods, commas, etc. (see Chapter 5) should also be edited out whenever their omission can be tolerated (see ANNEX D).

In the same manner as the job-specific survey point serial number (SPSN) of a bench mark is unique within a job, it is required that its designation be unique within a job as well. If two or more vertical control points with identical designations occur in a job, they should be rendered unique by appending to the respective designations, in order of preference:

1. The "year-mark-set," provided it appears on the respective mark or monument. Example: 872 3918 TIDAL 1 1935 and 872 3918 TIDAL 1 1975. *
2. The name of the county (parish, census division) in which the bench mark is located, followed by the symbol CO (PA,CD). Examples: 18 MONTGOMERY CO and 18 FREDERICK CO, A 178 LA FOURCHE PA and A 178 JEFFERSON PA, X 115 JUNEAU CD USGS and X 115 ANGOON CD USGS. *
3. The name of the locality (other than county, parish, or census division) in or near which the bench mark is located. Example: TBM 15 ALAMOGORDO and TBM 15 HOLLOMAN AFB. *

Whenever the designation of a vertical control point is modified in this manner for the purpose of making it unique within the respective job, the appended information becomes part of the bench mark designation, and care must be taken that exactly the same information is appended to the designation of that vertical control point wherever it appears, i.e., in the companion VERT OBS or VERT ELEV data set as well as in the VERT DESC data set.

Reset Marks: Frequently, a control point is in the path of construction and may be destroyed. If this situation is known before the construction project takes its toll, it is established practice to set another mark or monument a short distance away, outside the construction area, and to carry out appropriate connecting observations to transfer the horizontal or vertical control to the new survey point, thereby establishing it as a substitute or "reset" control point.

Although this new "reset" control point could be given an independent name or designation of its own, it has been found useful to follow a naming convention which, at a glance, identifies the control point as a "reset" and indicates which original control point it is replacing.

In connection with vertical control points which are normally assigned very short alphanumeric designations mostly numeric in character, the established practice is to identify a reset bench mark by the same designation as the bench mark it replaces to which is appended the word 'RESET' and the year in which the reset bench mark is set (e.g., U 135 RESET 1978 as opposed to U 135). Occasionally, when the designation of the replaced bench mark is lengthy, the word 'RESET' is omitted and

only the year is appended (e.g., LAKE WASHINGTON 3 1948 as opposed to LAKE WASHINGTON 3). For survey marks of organizations other than NGS, NOS, or C&GS, the word "RESET" and the year the mark was reset should be appended after the acronym or abbreviation of the agency. For example, a USGS survey mark reset in 1945 is designated 25 USGS RESET 1945, not 25 RESET 1945 USGS.

State or Country Code: This is a two-letter code to indicate the political unit and/or geographic area in which the vertical control point is located. For points in the United States or in Canada, enter the appropriate code for the respective state, commonwealth, province, or territory. For points outside the United States and Canada, enter the appropriate code for the respective country, island group, or geographic area. A complete list of the two-letter codes is given in ANNEX A.

County: The name of the next lower political subdivision in which the vertical control point is located. For points in the United States and Canada, enter the name of the first-order political subdivision of the respective state, commonwealth, province, or territory (i.e., county, parish, census division, independent city, etc.). The name of an independent city must be preceded by the symbol 'C OF' (e.g., C OF RICHMOND for RICHMOND, VA). For points in other countries, enter the name of the primary political subdivision of the respective country, such as state, province, district, etc. Up to 20 characters are allowed; use standard abbreviations if necessary.

Alias: An alternate form (i.e., alternate spelling, editing, and/or abbreviation) of the bench mark designation, or an entirely different designation assigned to the same bench mark by an agency other than the one which originally set the vertical control point. The same specifications, guidelines, and comments given for the primary bench mark designation also apply to an alias (see Designation above); however, note that an alias is not normally stamped (or otherwise inscribed) on the respective survey mark or monument.

In general, the proliferation of aliases is to be discouraged. Submit a *15* Alias Record for each known alias; however, not more than three *15* Alias Records are allowed in any one original or recovery description.

Designated Area Name: A bench mark, by its nature, is a member of a leveling line. Leveling lines are normally run along prominent transportation or communication arteries to form large loops. In areas of known or anticipated crustal uplift, subsidence, or seismic activity, level lines are often run as a special project to form dense area networks of vertical control which are usually releveled at frequent time intervals to monitor vertical movement of the Earth's crust in those areas.

The purpose of the optional *16* Area Record is to allow for the identification of such an area network or special leveling project of which the bench mark in question is a member. The *16* Area Record may also be used to provide any other location-related information (suitable for printing next to the "AREA--" caption of the published description) to be associated with the bench mark. Up to 32 characters (including all imbedded blanks) are allowed. Examples:

SOUTH OGDEN IRRIGATION SURVEY
NGS LOOPS 139 AND 205A
HOUSTON-GALVESTON SUBSIDENCE NETWORK

Nearest City or Town: The name of the locality within the confines of which the vertical control point is located, or else the name of the locality from which a distance and direction is given (see below). The localities used for this purpose should have a post office or railroad station and should appear on state highway maps. Append the standard two-letter state code (see ANNEX A) to the name of the locality if the locality given is not in the same state as the respective bench mark, or if the state must be specified to avoid confusion (e.g., KANSAS CITY KS as opposed to KANSAS CITY MO).

Distance and Direction: Leave this field blank if the vertical control point is located within the confines of the locality given under Nearest City or Town. Otherwise, enter the distance and direction from the locality given under Nearest City or Town to the bench mark in question.

The entry consists of the distance in miles (or kilometers followed by miles in parenthesis) to the nearest unit, nearest 0.1, or nearest 0.01, as appropriate, followed by one blank and by the units symbol ('MI' or 'KM'), followed by one blank and the direction expressed as a cardinal or intercardinal point of compass. Spell out NORTH, EAST, SOUTH, and WEST; use standard two- or three-letter symbols for the intercardinal points of the compass. When distance estimates or measurements are given in metric units, English equivalencies are to follow in parentheses. Examples: 8.7 MI NNE, 1.3 KM (0.8 MI) WEST, 2.3 KM (1.4 MI) NW.

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MONUMENTATION, RECOVERY, AND STAMPING DATA RECORDS

20, *21*, *22* Setting-by-Agency Record
23, *24*, *25* Recovery-by-Agency Record
26, *27* Setting and Monumentation Record
28 Stamping Record

*

The monumentation, recovery, and stamping data records, bearing the *20*-series data codes, are listed above; the block diagrams

illustrating the respective formats are found under FORMAT DIAGRAMS. The *20*, *21*, *22* Setting-by-Agency Record is required in every original description and is optional in a recovery description; the *23*, *24*, *25* Recovery-by-Agency Record is required in every recovery description. The *26* Record is required in an original description and optional in a recovery description. The *27* Record is required in both original and recovery descriptions. The *28* Record is required in both original and recovery descriptions if the *27* Monumentation Code is C, D, F, or P. An (optional) monumentation quality code (A, B, C, or D) may be entered in column 53 of the *27* record to override the codes which are software into the descriptions for publication. The software codes are functions of the setting classification codes (see ANNEX J). The codes are:

- A - Monuments of the most reliable nature which may be expected to hold their elevations very well.
 - B - Monuments which probably hold their elevations well.
 - C - Monuments which may hold their elevations but which are commonly subject to surface ground movements.
 - D - Monuments of questionable or unknown reliability.
- Caution: Do not use the override feature indiscriminately; monumentation quality refers to the ability of a monument to hold its elevation, not the skill with which it was constructed.

Analogously to the bench mark identification data records treated in the preceding section, more than one data code appears in the monumentation, recovery, and stamping data records (see the respective format diagrams) to serve as labels for important data items and thereby to facilitate the extracting and coding of these data items from the source documents. The data items to be entered on these records are largely self-explanatory; however, the following data items will be explained in greater detail.

Agency Code: This is a one-digit code designed to indicate the organization or type of organization which physically set the vertical control point (*20*, *21*, *22* Setting-by-Agency Record) or the organization or type of organization which recovered the vertical control point (*23*, *24*, *25* Recovery-by-Agency Record). A complete list of the specific agency codes is given below; this list is also given in ANNEX J where all codes peculiar to the VERT DESC data set are collected.

- 0 - unknown
- 1 - NGS or CGS (USC&GS)
- 2 - U.S. Geological Survey (USGS)
- 3 - U.S. Department of Defense (DOD)
- 4 - other federal or interstate agency

- 5 - state agency
- 6 - county, city, or regional agency
- 7 - commercial organization or private firm
- 8 - National Ocean Survey (NOS)
- 9 - foreign governmental agency

Other Control: This is a one-letter code which indicates the survey mark or monument in question fulfills other geodetic or geophysical function(s) aside from being a vertical control point. A code is also provided for an occasional bench mark which was set but has not been leveled to, and hence possesses no vertical control. As many as four codes may be entered (in any order, left-justified, no imbedded blanks). A complete list of the specific Other Control codes is given below; this list is also in ANNEX J where all codes peculiar to the VERT DESC data set are collected.

- A - astronomic observation(s) for the mark resides in the NGS Data Base. *
- F - fault monitoring site *
- G - gravity observation(s) for the mark resides in the NGS Data Base. *
- H - horizontal geodetic coordinates of the mark reside in the NGS Data Base. *
- M - magnetic station *
- N - no vertical control (i.e., not connected to the national vertical geodetic control network) *
- O - other (see descriptive text) *
- T - tidal bench mark *
- X - recovery description written for this survey point during current project, but first leveling tie to the NGS Vertical Network was made in this current project. *
- Z - survey point previously tied to the NGS Vertical Network and recovery description written in this current project, but survey point was not leveled in this current project. *

Condition Code: This is a one-letter code to indicate the condition of the respective mark or monument as determined by the recovery of the vertical control point. A complete list of the specific condition codes is given below; this list is also in ANNEX J where all codes peculiar to the VERT DESC data set are collected.

- G - good, fair
- N - not recovered, not found, lost
- O - other (see descriptive text)
- P - poor, disturbed, mutilated
- X - destroyed

Setting Classification Code: This is a two-digit code to indicate the type of setting (shallow or deep), the type of design and material used for the respective monument, and/or the natural or man-made object which serves as the setting for the respective bench mark disk (or other type of marker - see Monumentation Code). A complete list of the specific setting codes is given below; this list is also found in ANNEX J where all codes peculiar to the VERT DESC data set are collected.

00 - unspecified

Shallow Settings (less than 10 ft.):

- 10 - unspecified shallow
- 11 - metal rod with base plate
- 12 - concrete post
- 13 - shallow-set pipe
- 14 - shallow-set metal rod (without base plate)

Unsleeved Deep Settings (10 ft. or more):

- 20 - unspecified deep
- 21 - copper-clad steel rod
- 22 - galvanized steel pipe
- 23 - galvanized steel rod
- 24 - stainless steel rod
- 25 - aluminum alloy rod

Rocks and Boulders:

- 30 - unspecified rock
- 31 - rock outcrop, rock ledge, rock cut, or bedrock
- 32 - boulder

Structures - must be specified (see Setting below):

- 40 - light structures (other than listed below)
- 41 - pavements (street, sidewalk, curb, apron, etc.)
- 42 - retaining walls (e.g., culverts and small bridges)
- 43 - piles and poles (e.g., spike in utility pole)
- 44 - footings and foundation walls of small/medium structures
- 45 - mat foundations (landings, platforms, steps, etc.)

- 50 - massive structures (other than listed below)
- 51 - massive retaining walls
- 52 - abutments and piers of large bridges
- 53 - tunnels
- 54 - massive structures with deep foundations
- 55 - large structures with foundations on bedrock

Sleeved Deep Settings (10 ft. or more):

- 60 - unspecified rod/pipe in sleeve
- 61 - copper-clad steel rod in sleeve
- 62 - galvanized steel pipe in sleeve
- 63 - galvanized steel rod in sleeve
- 64 - stainless steel rod in sleeve
- 65 - aluminum alloy rod in sleeve

Setting: A short phrase describing the setting which corresponds to the respective setting code (see Setting Classification Code above) suitable for printing next to the "SETTING--" caption of the published description. As many as 32 characters (including all imbedded blanks) are allowed. This entry is required if the setting code is 40,41,42,43,44,45 (light structure) or 50,51,52,53,54,55 (massive structure); optional otherwise.

Monumentation Code: This is a one-letter code to indicate the type of marker used. A complete list of the specific monumentation codes is given below; this list is also found in ANNEX J where all codes peculiar to the VERT DESC data set are collected.

B - bolt	I - metal rod	S - spike
C - cap-and-bolt	N - nail	T - chiseled triangle
D - survey disk (any type)	O - chiseled circle	V - stone monument
F - flange-encased rod	P - pipe cap	X - chiseled cross
H - drill hole	Q - chiseled square	Z - other (see de- scriptive text)
	R - rivet	

Disk Type: This is a two-digit code to indicate the type of survey disk which marks the vertical control point. Enter the appropriate disk type only if the monumentation code is "D" (survey disk); leave the field blank otherwise. A complete list of the specific disk types is given below; this list is also found in ANNEX J where all codes peculiar to the VERT DESC data set are collected.

- 00 - unspecified
- 01 - bench mark disk
- 02 - tidal bench mark disk
- 03 - triangulation station disk
- 04 - traverse station disk
- 05 - topographic station disk
- 06 - survey disk (not listed)
- 07 - reference mark (RM) disk
- 08 - azimuth mark (Az Mk) disk
- 09 - gravity station disk
- 10 - gravity reference mark disk
- 11 - magnetic station disk

Monumentation Quality Code: This is a one-character code that may be entered to override the default codes which are softwareed into the descriptions for publication. The default codes are listed with the Setting Classification Codes in Annex J.

- A - monuments of the most reliable nature which may be expected to hold their elevations very well.
- B - monuments which probably hold their elevations well.
- C - monuments which may hold their elevations but which are commonly subject to surface ground movements.
- D - monuments of questionable or unknown reliability.

Origin of the Vertical Control Point: Enter the acronym or abbreviation of the agency whose name is precast on the monument (see Annex C). If nothing is precast, leave this field blank.

Stamping: Enter the exact stamping or inscription which is peculiar to the vertical control point in question (do not include any information which is precast into the survey marker). A stamping normally appears on a bench mark whose monumentation code is "C" (cap-and-bolt), "D" (survey disk), "F" (flange-encased rod), or "P" (pipe cap). In addition to the respective survey point name or designation, a stamping usually includes a four-digit "year-mark-set" and may include an elevation value with or without the corresponding units symbol appended. Example: H 325 1965 320.695 FT. Do not submit a *28* Stamping Record if no stamping or inscription identifies the bench mark.

GENERAL DESCRIPTIVE TEXT RECORDS

30 Descriptive Text Record

The purpose of the *30* record is to provide the space for the recording of one "line" of descriptive text. A line of descriptive text is assumed to contain at most 70 characters (including all imbedded blanks). Accordingly, aside from the Sequence Number and Data Code fields which are common to all records, the *30* Descriptive Text Record contains a 70-character Descriptive Text field (see FORMAT DIAGRAMS).

Descriptive Text - Original Description: The descriptive text of an original description consists of any number of *30* general descriptive text records forming one paragraph of narrative text. Optionally, a set of *30* records may be supplemented by one or more *40*-series partially coded descriptive text records used in lieu of standard phrases at the end of the descriptive paragraph - see OPTIONAL PARTIALLY CODED DESCRIPTIVE TEXT RECORDS.

In general, the descriptive text paragraph should give (1) specific directions to reach the vertical control point in question from a readily locatable landmark such as a public building in a nearby town or the crossroads of prominent highways, (2) pinpoint its location in terms of distance and direction (point of compass) from one or more reference objects in the immediate vicinity, (3) describe in sufficient detail the mark or monument itself including the setting thereof, (4) provide vertical reference by stating that it is a certain distance above, below, or about level with a nearby reference object (if applicable), and (5) give the distance and direction (point of compass) from a witness post, if one has been set in the immediate vicinity.

Example:

10.7 MILES SOUTH ALONG U.S. HIGHWAY 101 FROM THE INTERSECTION WITH FRONT STREET AT CRESCENT CITY, THENCE 0.3 MILE NORTHWEST ALONG FORMER U.S. HIGHWAY 101, ACROSS THE HIGHWAY FROM A 72-INCH REDWOOD TREE, 16 FEET NORTHEAST OF THE CENTERLINE OF THE HIGHWAY, 12 FEET SOUTHEAST OF AN 8-INCH BIRCH TREE, A STANDARD DISK SET IN THE TOP OF THE NORTHWEST END OF THE NORTHEAST CONCRETE HEAD WALL OF A CULVERT, ABOUT LEVEL WITH THE HIGHWAY, AND 0.6 FOOT EAST OF A WITNESS POST.

Descriptive Text - Recovery Description: The descriptive text of a recovery description is similar to that of the original description treated above, i.e., any number of *30* general descriptive text records, possibly followed by one or more *40*-series optional partially coded descriptive text records, forming one paragraph of descriptive text.

In general, the descriptive text paragraph of a recovery description should indicate whether or not the vertical control point in question was recovered (i.e., found), and the condition of the respective mark or monument, and it should also contain a statement reflecting the adequacy of the respective original description and/or previous recovery descriptions, if any, followed by corrections and/or additions to prior descriptions, as appropriate. Alternatively, an entirely new narrative description in the mold of the descriptive text paragraph of an original description (see above) may be given. Examples:

1. RECOVERED IN GOOD CONDITION. THE 1935 DESCRIPTION IS ADEQUATE EXCEPT THAT THE SIGN REFERRED TO THEREIN NO LONGER EXISTS.
2. RECOVERED IN GOOD CONDITION. NEW DESCRIPTION FOLLOWS. 15.2 MILES EAST ALONG THE WIMEK ROAD FROM THE SMITH RIVER POST OFFICE, 0.3 MILE WEST OF INDIAN SPRINGS, 60 FEET EAST OF A CREST IN THE ROAD, 19 FEET SOUTH OF THE CENTER OF THE ROAD, A U.S. GENERAL LAND OFFICE STANDARD SECTION-CORNER CAP RIVETED TO THE TOP OF AN IRON PIPE ENCASED IN CONCRETE, 2.5 FEET BELOW THE HIGHWAY.
3. AFTER PROLONGED SEARCH, EVIDENCE WAS FOUND THAT THE BENCH MARK HAS BEEN DESTROYED.

Since the condition code entered as data item *25* on the *23*, *24*, *25* Recovery-by-Agency Record (see MONUMENTATION, RECOVERY, AND STAMPING DATA RECORDS) normally conveys sufficient information as to whether or not the vertical control point in question was recovered and as to the condition of the respective mark or monument, the descriptive text of a recovery description may be limited to just the statement "RECOVERED AS DESCRIBED." - or it may be omitted altogether - whenever the latest prior narrative description on record is still adequate.

Rules for the Keying of Descriptive Text: As was stated above, the descriptive text paragraph of an original or recovery description consists of any number of *30* general descriptive text records possibly followed by one or more *40*-series records (see OPTIONALLY PARTIALLY CODED DESCRIPTIVE TEXT RECORDS). In keying general descriptive text, note that only the following special characters are allowed in addition to the usual alphabetic (A-Z) and numeric (0-9) characters (see Chapter 5):

(*) asterisk	(+) plus sign
() blank or space	(-) minus sign
(,) comma	(=) equal sign
(.) period or decimal point	(/) slash or solidus
(\$) dollar sign	(() left parenthesis
	()) right parenthesis

Care must be exercised to avoid miskeying the following characters:

0 - number "zero"	1 - number "one"	2 - number "two"
0 - letter "O"	L - letter "L"	Z - letter "Z"

In addition, the following rules apply:

1. Do not divide words (or other character groups) between successive records (however, a character string containing the separator '-' or '--' may be divided at either end of such a separator).
2. Key two spaces (blanks) following the period before the start of a new sentence.
3. Substitute period (.) or comma (,) for semicolon (;), as appropriate.
4. Substitute 'AND' (in text) or plus sign (+) (in abbreviation or acronym) for ampersand (&).
5. Substitute two consecutive hyphens (--) without any preceding or following blanks for a colon (:), i.e., key XXXXXX: YYYY as XXXXXX--YYYY.
6. Key a dash as space-hyphen-space, i.e., as XXXX - YYYYYY.
7. Key a hyphen (instead of a blank) in an improper (mixed) fraction (e.g., 5-1/2, etc.).
8. Omit (i.e., do not key) any special characters other than those listed above (i.e., ', ", _, etc.).

9. All distance measurements or estimates that are given in metric units must be followed by their English equivalency in parentheses.

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OPTIONAL PARTIALLY CODED DESCRIPTIVE TEXT RECORDS

- *40* Concrete Post Record (Optional)
- *41* Rod/Pipe Record (Optional)
- *42* Vertical Reference Record (Optional)
- *43* Witness Post Record (Optional)

The optional partially coded descriptive text records, identified by *40*-series data codes, are listed above; the block diagrams illustrating the respective formats will be found under FORMAT DIAGRAMS. The purpose of the *40*-series records, which are individually optional, is to provide an abbreviated means of coding several often-used standard phrases at the end of the descriptive text paragraph (i.e., following specific directions how to reach the bench mark and distance-and-direction ties from local reference objects given by *30* records - see GENERAL DESCRIPTIVE TEXT RECORDS).

If applicable, at most one of each *40*-series records may appear in an original or recovery description (but note that the use of the *40* Concrete Post Record precludes the use of the *41* Rod/Pipe Record). The *40*-series records must follow as a group (in order of their increasing data codes) after the last *30* Descriptive Text Record of the respective descriptive text paragraph (i.e., they may not appear imbedded among the *30* records). The data items to be entered on these records are self-explanatory - see Figures 7-1 and 7-2 and the respective format diagrams.

40 Concrete Post Record: Use this record in lieu of the phrase - A DISK SET INTO THE TOP OF A CONCRETE POST FLUSH WITH THE GROUND (or PROJECTING (or RECESSED) ___ INCHES (or CENTIMETERS depending on Units Code)) - see the respective format diagram.

41 Rod/Pipe Record: Use this record in lieu of the phrase - STAINLESS STEEL (or other material as per Setting Code) ROD (or PIPE) SET TO THE DEPTH OF ___ FEET (or METERS depending on Units Code), IN A SLEEVE EXTENDING TO THE DEPTH OF ___ FEET (or METERS), ENCASED IN A PIPE FLUSH WITH THE GROUND (or PROJECTING (or RECESSED) ___ INCHES (or CENTIMETERS)) - or, for an unsleeved rod mark, in lieu of the same phrase without reference to sleeve depth (if the Sleeve Depth field is left blank) - see the respective format diagram.

42 Vertical Reference Record: Use this record in lieu of the phrase - ABOUT LEVEL WITH ... (object specified), or else ___ FEET (or METERS depending on Units Code) ABOVE (or BELOW) ... (object specified) - see the respective format diagram.

43 Witness Post Record: Use this record in lieu of the phrase -
____ FEET (or METERS depending on Units Code) ____ (point of compass)
FROM A WITNESS POST (or FROM ... (object specified) if other than a
witness post) - see the respective format diagram.

EXAMPLE

An example of a coded bench mark description is given in Figure 7-4. It is the same bench mark description as the one given as an example of an original description in Figure 7-1 with two abridged subsequent recovery descriptions added, thus making it a combined set (DRC Code C - see Combined Set). The same bench mark description, formatted for publication, appears in Figure 7-5.

FORMAT DIAGRAMS

For each record which may appear in a VERT DESC data set (see Table 7-1), a block diagram has been prepared to illustrate the respective format. These "format diagrams" have been designed to fulfill the following objectives:

1. Each record is 80 characters long (standard punched card image).
2. Each record has a fixed format, i.e., every data field has a specific length and specific position within the record.
3. Each format diagram is a graphical image of the respective record.
4. Within the limits of available space, information and instructions concerning the data item to be entered in each data field are provided on the format diagrams to render them self-explanatory.
5. Whenever appropriate, sample entries are shown in the data entry line of each format diagram.
6. Each data field is characterized as to its type by a string of lower-case characters which appear immediately below the data entry line.

Data Field Types:

1. Alpha Field (aa...a) - intended for a data item which is coded as a string of alphabetic, numeric, and/or special characters, with or without imbedded blanks, to be entered into the respective data field left-justified and blank-filled on the right. See Chapter 5 (or "Rules for the Keying of Descriptive Text" (this chapter)) for a list of special characters which are allowed.


```

000010*B5*VERTDESCNGS      NATIONAL GEODETIC SURVEY                      19780501
:
:
004560*10*0031C340747N1162448W      *11*N341162                      *12*102
004570*13*Y 1268                      *14*CA/SAN BERNARDINO
004580*16*SCARP TEST PROJECT
004590*17*YUCCA VALLEY                      *18*0.4 MI NORTH
004600*20*1/NGS                          *21*1976JWT                      *22*G
004610*26*63/                          *27*F   NGS
004620*28*Y 1268 1976
004630*30*0.45 MILE NORTH ALONG OLD WOMAN SPRINGS ROAD FROM THE JUNCTION OF
004640*30*STATE HIGHWAY 62 AT YUCCA VALLEY, AT THE JUNCTION OF CRESCENT DRIVE,
004650*30*65 FEET NORTHWEST OF THE CENTER OF THE T JUNCTION, 56 FEET WEST OF
004660*30*THE CENTERLINE OF THE ROAD, 37 FEET NORTH OF THE CENTERLINE OF THE
004670*30*DRIVE, 4.5 FEET NORTH OF POWER POLE 242924 WITH GUY WIRE AND A
004680*30*TRANSFORMER.
004690*41*E63113 50 P6
004700*42*      LCRESTVIEW DRIVE
004710*43*E3.5 NNW
004720*23*5/CADT                          *24*1976JPK                      *25*G
004730*23*2/USGS                          *24*1978FS                      *25*G
004740*30*RECOVERED AS PREVIOUSLY DESCRIBED, EXCEPT FOR THE WITNESS POST WHICH
004750*30*IS MISSING.
:
:
009870*B5*

```

Figure 7-4 - Coded and keyed bench mark description.

```

***** BENCH MARK DESCRIPTION *****
DESIGNATION--Y 1268      STATE--CA COUNTY--SAN BERNARDINO QUAD--N34116234 QSN--0084
***** MONUMENT BY--NGS ***** YR--1976 COP--JWT MARK TYPE--FLANGE-ENCASED ROD *****
STAMPING--Y 1268 1976 OTHER CONTROL--G
SETTING--GALVANIZED STEEL ROD IN SLEEVE AREA--SCARP TEST PROJECT
LOCATED--0.4 MI NORTH FROM THE CITY OR TOWN OF--YUCCA VALLEY
*****
0.45 MILE NORTH ALONG OLD WOMAN SPRINGS ROAD FROM THE JUNCTION OF STATE HIGHWAY 62 AT YUCCA VALLEY,
AT THE JUNCTION OF CRESTVIEW DRIVE, 65 FEET NORTHWEST OF THE CENTER OF THE T JUNCTION, 56 FEET WEST
OF THE CENTERLINE OF THE ROAD, 37 FEET NORTH OF THE CENTERLINE OF THE DRIVE, 4.5 FEET NORTH OF POWER
POLE 242924 WITH GUY WIRE AND A TRANSFORMER. GALVANIZED STEEL ROD DRIVEN TO THE DEPTH OF 113 FEET,
IN A SLEEVE EXTENDING TO THE DEPTH OF 50 FEET, ENCASED IN A PIPE PROJECTING 6 INCHES, ABOUT LEVEL
WITH CRESTVIEW DRIVE, 3.5 FEET NORTH-NORTHWEST FROM A WITNESS POST.
***** RECOVERY BY--CADT ***** YR--1976 COP--JPK CONDITION--GOOD *****
***** RECOVERY BY--USGS ***** YR--1978 COP--FS CONDITION--GOOD *****
RECOVERED AS PREVIOUSLY DESCRIBED, EXCEPT FOR THE WITNESS POST WHICH IS MISSING.

```

Figure 7-5 - Bench mark description in publishable format.

2. Blank Field (bb...b) - to be blank-filled. Data fields which are designated as blank fields must be left blank, i.e., no data items may be entered in these fields.

3. Constant (Numeric) Field (cc...c) - intended for a data item which is a number (i.e., an integer, a proper or improper fraction, or a decimal fraction) coded as a string of numeric characters (prefixed with minus sign if the number is negative) which may contain one leading or imbedded (but not trailing) decimal point if it is a decimal fraction, or an imbedded hyphen and/or slash if it is a proper or improper (mixed) fraction such as 3/4, 5-1/2, etc., to be entered into the respective data field left-justified and blank-filled on the right.

4. Integer Field (ii...i) - intended for a data item which is coded as a string of numeric characters representing a positive or negative integer number, to be entered into the respective data field right-justified. In the case of a positive integer number, zero-fill any unused columns to the left. In the case of a negative integer number, code the minus sign immediately preceding the left most nonzero digit, and blank-fill any unused columns to the left of the minus sign.

5. Specific Character Field (ss...s) - intended to contain a specific alphabetic, numeric, or special character or a specific group of characters. Every "s" column of a specific character field must contain the character shown in that position in the data entry line of the respective format diagram.

Required Data: In general, only those records which are applicable to the original or recovery description at hand should be submitted for that original or recovery description in the VERT DESC data set. The required record sequence is shown in Table 7-3. The character fields intended for data items which are deemed essential have been shaded on the format diagrams; if applicable to the original or recovery description being coded, these character fields must be filled out in accordance with the instructions given on the respective format diagrams or in the text of this chapter.

BENCH MARK DESCRIPTION

*1*SPSX _____, *2*DC CODE _____, *3*APPROX LAT _____, *4*APPROX LON _____, *5*11*ROAD _____, *6*OSN _____, *7*12*LINE _____
 *8*DESIGNATION _____, *9*13*STATE CODE/TERMINAL _____ / _____
 *10*ALTITUDE _____ (PARISH in Louisiana - State CENSUS DIVISION in Alaska)
 *11*AREA _____
 *12*NEAREST CITY OR TOWN _____, *13*DISTANCE AND DIRECTION FROM *14*NEAREST CITY OR TOWN _____
 *15*DATE/RECOVERED BY AGENCY _____ / _____, *16*YEAR _____, *17*CHIEF OF PARTY _____, *18*OTHER CONTROL _____
 *19*DATE/RECOVERY BY AGENCY _____ / _____, *20*YEAR _____, *21*CHIEF OF PARTY _____, *22*CONDITION OF MARK _____
 *23*MARK SETTING CLASSIFICATION _____ / _____, *24*INSTRUMENTATION _____, *25*DISS TYPE _____
 *26*STAMPING _____, *27*QUALITY CONTROL _____

ORIGINAL OR RECOVERY DESCRIPTIVE TEXT

28 _____
 29 _____
 30 _____
 31 _____
 32 _____
 33 _____
 34 _____
 35 _____
 36 _____
 37 _____
 38 _____
 39 _____
 40 _____
 41 _____
 42 _____
 43 _____
 44 _____
 45 _____
 46 _____
 47 _____
 48 _____
 49 _____
 50 _____
 51 (UNIT, E-English/M-metric) A DISK SET INTO THE TOP OF A CONCRETE POST, F-FLUSH WITH THE GROUND/P-PROJECTING/R-RECESSED, IN/M
 52 (UNIT, Setting Code: _____, same as in *26*) ROD/PIPE DRIVEN TO THE DEPTH OF _____, FT/M, IN A SLEEVE EXTENDING TO THE DEPTH OF _____, FT/M
 (always preceding entry blank if no sleeve), ENCASED IN A PIPE, F-FLUSH WITH THE GROUND/P-PROJECTING/R-RECESSED, IN/M
 53 (UNIT, _____, FT/M, A-ABOVE/B-BELOW/L-ABOUT LEVEL WITH) (OVERS and FT/M blank if "L")
 54 (UNIT, _____, FT/M, (Point of Compass): FROM A WITNESS POST - also specify object, _____
 _____, M/YEAR, of bench mark, _____, (start entry with article (a,an,the) if applicable)

D=Self-standing original description
 R=Self-standing recovery description

*14*STATE CODE: Use standard two-letter
 POSTAL CODE in the United States,
 its territories and possessions.
 Consult the User's Guide to the
 Input Formats and Specifications
 of the National Geodetic Survey
 Data Base for points elsewhere.

*701*23*AGENCY CODE:

- 0=unknown
- 1=USGS (USCAGS)
- 2=U.S. Geological Survey (USGS)
- 3=U.S. Department of Defense (DOD)
- 4=other federal or interstate agency
- 5=state agency
- 6=county, city, or regional agency
- 7=commercial organization or private firm
- 8=National Ocean Survey (NOS)
- 9=foreign government agency

*17*OTHER CONTROL CODE:

- A=astronomic station
- F=fault monitoring site
- G=gravity station
- H=horizontal control point
- M=magnetic station
- N=no vertical control (not presently
 or anticipated to be connected to
 the National Vertical Control
 Network)
- O=other (see descriptive text)
- T=tidal bench mark
- X=no vertical control (not
 connected to the National
 Vertical Control Network at
 time of recovery, but expected
 to be after this survey)

*23*CONDITION CODE:

- 0=GOOD or fair
- 1=NOT RECOVERED or not found, lost
- 2=other (SEE DESCRIPTIVE TEXT)
- 3=POOR or disturbed, mutilated
- 4=DESTROYED

- 00=UNSPECIFIED
- 10=SHALLOW SETTINGS (less than 10ft):
- 10=UNSPECIFIED SMALL
- 11=METAL ROD WITH BASE PLATE
- 12=CONCRETE POST
- 13=SHALLOW-SET PIPE
- 14=SMALL-SET METAL ROD
 (without base plate)
- Unaltered Deep Settings:
- 20=UNSPECIFIED DEEP
- 21=COPPER-CLAD STEEL ROD
- 22=GALVANIZED STEEL PIPE
- 23=GALVANIZED STEEL ROD
- 24=STAINLESS STEEL ROD
- 25=ALUMINUM ALLOY ROD

ROCKS AND Boulders:

- 30=UNSPECIFIED ROCK
- 31=ROCK OUTCROP, rock ledge,
 rock cap, or boulder
- 32=BOULDERS

Structures:

- 40=UNSPECIFIED LIGHT STRUCTURE
- 41=PAVEMENTS, such as streets, sidewalks,
 aprons, curbs, etc.
- 42=RETAINING WALLS AND BULKHEADS, including
 headwalls and wingwalls of culverts and
 small bridges
- 43=PIERS AND POLES (e.g., spire (or utility pole)
- 44=FOOTINGS AND FOUNDATION WALLS OF SMALL OR MEDIUM
 STRUCTURES
- 45=SLAB FOUNDATIONS (bearing surface same size as
 structure), such as landings, platforms,
 steps, floors, tower foundations, bases of
 monuments, etc.
- 50=UNSPECIFIED MASSIVE STRUCTURES
- 51=MASSIVE RETAINING WALLS, including headwalls
 and retaining walls of very large bridges.
- 52=ABUTMENTS AND PIERS OF VERY LARGE BRIDGES,
 including overpasses and underpasses
- 53=TUNNELS
- 54=MASSIVE CONCRETE, MASONRY, OR STEEL STRUCTURES
 WITH DEEP FOUNDATIONS
- 55=LAKE CONCRETE, MASONRY, OR STEEL STRUCTURES
 WITH FOUNDATIONS ON BEDROCK

Flanged Deep Settings:

- 60=UNSPECIFIED ROD/PIPE SLEEVE
- 61=COPPER-CLAD STEEL ROD IN SLEEVE
- 62=GALVANIZED STEEL PIPE IN SLEEVE
- 63=GALVANIZED STEEL ROD IN SLEEVE
- 64=STAINLESS STEEL ROD IN SLEEVE
- 65=ALUMINUM ALLOY ROD IN SLEEVE

- B=BOLT
- C=CAP-AND-BOLT
- D=SURVEY DISK (any type)
- E=FLANGE-ENCASED ROD
- M=DRILL HOLE
- I=METAL ROD
- N=NAIL
- O=CHISELED CIRCLE
- P=PIPE CAP
- Q=CHISELED SQUARE
- R=RIVET
- S=STAKE
- T=CHISELED TRIANGLE
- U=STONE MONUMENT
- X=CHISELED CROSS
- Z=SEE DESCRIPTIVE TEXT:

*20*MARK TYPE (blank if not survey disk)

- 00=unspecified SURVEY DISK
- 01=SPICE MARK DISK
- 02=TIDAL BENCH MARK DISK
- 03=TRIANGULATION STATION DISK
- 04=TRAVERSE STATION DISK
- 05=TOPOGRAPHIC STATION DISK
- 06=SURVEY DISK (not listed)
- 07=REFERENCE MARK DISK
- 08=AZIMUTH MARK DISK
- 09=GRAVITY STATION DISK
- 10=GRAVITY REFERENCE MARK DISK
- 11=MACRETTIC STATION DISK

*22*QUALITY DIFFERENCE (for MCS use only)

40/#41*/#42*/#43*UNITS CODE:

7=English M=metric units

*43*POINTS OF COMPASS: N, NE, E, SE, S, SW, W, NW, NN, NNW, NNW, NNW, NNW.

10, *11*, *12* Bench Mark Identification Record. This must be the leading record of every self-standing original description (DRC Code D), recovery description (DRC Code R), and of the first element (original or recovery description) in a combined set (DRC Code C - see footnote).		
000000001	Line Identifier - enter NGS-specific line number or other alphanumeric identifier. (For NGS use only)	
000000001	Data Code - optional when no information follows. (*12* - NGS-Specific Line Identifier)	*12*103
1234567890	NOTE - Entry of Quad Station Number (QSN) is applicable only to recovery descriptions for bench marks which already reside in the National Geodetic Survey (NGS) Data Base.	
1234567890	Quad Station Number (QSN) - enter the QSN assigned by the NGS Data Base - leave blank if unavailable.	
1234567890	30', 15', 7½' Quadrantal Subdivision Indicators 1-NE, 2-SE, 3-SW, 4-NW sub-quads, else blank.	
1234567890	Quad Identifier (QID) IXI Quad containing the bench mark - blank if unknown.	
1234567890	Longitude of SE Corner 000-359° Wof Greenwich.	
1234567890	Latitude of SE Corner	
1234567890	Hemisphere - N or S.	
1234567890	Data Code - optional when no information follows. (*11* - Quad Identifier and Quad Station Number)	*11*
1234567890	Junction Code - enter J if mark is a Basic Net A junction (to be entered by NGS personnel only).	J
1234567890	ACRN (35-40)	
1234567890	Position - optional for recovery descriptions of bench marks already resident in NGS Data Base - required otherwise.	
1234567890	Direction of Longitude - E or W.	
1234567890	Longitude - degrees, minutes, and seconds (DDMMSS).	
1234567890	Direction of Latitude - N or S.	
1234567890	Latitude - degrees, minutes, and seconds (DDMMSS).	
1234567890	DRC Code - see footnote.	
1234567890	Survey Point Serial Number (SPSN) - must be identical to SPSN of the same point in VERT OBS data set.	
1234567890	Data Code - preceded and followed by asterisk. (*10* - SPSN, DRC Code, and Position)	
1234567890	Sequence Number	
1234567890	Increment by 10 on successive records to allow for insertions.	

DRC Code: D - original description, R - recovery description, C - combined set (full original or recovery description followed by one or more abridged subsequent recovery descriptions each of which must begin with the Recovery-by-Agency Record). *

15 Alias Record. Use this record if and only if there exist one or more aliases by which the vertical control point is known in addition to its primary designation given on the *13*, *14* record. At most three *15* records are allowed in any original or recovery description.

00000000111111112222222233333333333333444444555555566666677777777778 1234567890123456789012345678901234567890123456789012345678901234567890	
	Alias - must not exceed 25 characters. In every case, the alias must be edited in conformity with <u>Guidelines for Survey Point Names and Designations</u> (ANNEX D).
	Data Code - preceded and followed by asterisk. (*15* - Alias)
	Sequence Number Increment by 10 on successive records to allow for insertions.
iiiiiii*15*34 185 iiiiiislisaa 0000000011111111222222223333333333333344444455555556666667777777778 1234567890123456789012345678901234567890123456789012345678901234567890	iiiiiiiislisaa 0000000011111111222222223333333333333344444455555556666667777777778 1234567890123456789012345678901234567890123456789012345678901234567890

16 Area Record. Use this record to indicate that the bench mark is a member of a designated area network, or to provide other location-related information to be associated with the vertical control point. At most one *16* record is allowed in any original or recovery description.

00000000011111112222222222333333333344444444445555555555666666666677777777778
 1234567890123456789012345678901234567890123456789012345678901234567890

		<p>Designated Area Name or other location-related information, not to exceed 32 characters.</p> <p>Examples: SOUTH OGDEN IRRIGATION SURVEY NGS LOOPS 139 AND 205A HOUSTON SUBSIDENCE NETWORK etc.</p>	
<p>Data Code - preceded and followed by asterisk.</p>	<p>Sequence Number Increment by 10 on successive records to allow for insertions.</p>		

nnnnn*16*ARVIN-MARICOPA
 11111111111111112222222222333333333344444444445555555555666666666677777777778
 00000000011111112222222222333333333344444444445555555555666666666677777777778
 1234567890123456789012345678901234567890123456789012345678901234567890

17, *18* Nearest-City-or-Town Record. Use this record to indicate the nearest city or town and to give the distance and direction from the nearest city or town to the bench mark. Omit the distance-and-direction entry for bench marks within the immediate confines of a locality.

00000000111111112222223333334444555555666666777777888888999999
 123456789012345678901234567890123456789012345678901234567890

<p>NOTE - Points of Compass:</p> <table border="1"> <tr> <td>NORTH</td> <td>NNE</td> <td>NE</td> <td>ENE</td> </tr> <tr> <td>EAST</td> <td>ESE</td> <td>SE</td> <td>SSE</td> </tr> <tr> <td>SOUTH</td> <td>SSW</td> <td>SW</td> <td>WSW</td> </tr> <tr> <td>WEST</td> <td>WNW</td> <td>NW</td> <td>NNW</td> </tr> </table>		NORTH	NNE	NE	ENE	EAST	ESE	SE	SSE	SOUTH	SSW	SW	WSW	WEST	WNW	NW	NNW
NORTH	NNE	NE	ENE														
EAST	ESE	SE	SSE														
SOUTH	SSW	SW	WSW														
WEST	WNW	NW	NNW														
<p>Distance and Direction from the nearest city or town. Enter the distance in miles or kilometers (to nearest 0.1) followed by units (MI or KM) and by the direction expressed as a cardinal or intercardinal point of compass. Spell out NORTH, EAST, SOUTH, and WEST; use standard two- or three-letter symbols for intercardinal points of compass.</p>																	
<p>Data Code - optional when no information follows. (*18* - Distance and Direction)</p>																	
<p>Nearest City or Town - enter the name of the nearest locality from which a distance and direction can be given, or else the name of the locality within the confines of which the bench mark is located. The localities used for this purpose should appear on ordinary state highway maps.</p> <p>Append the standard two-letter state code (ANNEX A) to the name of the locality only if the locality is not in the same state as the bench mark or if the state must be specified to avoid confusion (e.g. KANSAS CITY KS as opposed to KANSAS CITY MO).</p>																	
<p>NOTE - Omit the distance-and-direction entry for bench marks located within the confines of the locality given herein.</p>																	
<p>Data Code - preceded and followed by asterisk. (*17* - Nearest City or Town)</p>																	
<p>Sequence Number Increment by 10 on successive records to allow for insertions.</p>																	

 *18*12.7 KM(7.9 MI) NW
 bbs11saaaaa
 00000001111111222222333333444444555555666666777777888888999999
 123456789012345678901234567890123456789012345678901234567890

26, *27* Setting and Monumentation Record. Use this record to indicate the setting or the type of the bench mark and to specify the type of mark or monument used. Few commonly occurring setting classification codes are given in the footnote; refer to ANNEX J for a complete list.

0000000011111122222222223333333333444444555555555566666666667777777777	NOTE - Monumentation Code (see ANNEX J): B - bolt C - cap-and-bolt D - survey disk (any type) F - flange-encased rod H - drill hole I - metal rod N - nail O - chiseled circle P - pipe cap Q - chiseled square R - rivet S - spike T - chiseled triangle V - stone monument X - chiseled cross Z - other (see description)	0000000011111122222222223333333333444444555555555566666666667777777777	Origin of the Vertical Control Point: Enter the acronym or abbreviation of the agency whose name is precast on the monument. Leave blank for marks not having a precast agency name.
1234567890123456789012345678901234567890123456789012345678901234567890	Monumentation Quality Code - enter only if monumentation quality is not standard. Disk Type - enter only if Monumentation Code is D. Monumentation Code - see NOTE above. Data Code - preceded and followed by asterisk. (*27* - Monumentation)	1234567890123456789012345678901234567890123456789012345678901234567890	
	NOTE - Disk Type (see ANNEX J): 00 - unspecified 01 - bench mark disk 02 - tidal bench mark disk 03 - triangulation station disk 04 - traverse station disk 05 - topographic station disk 06 - survey disk (not listed) 07 - reference mark (RM) disk 08 - azimuth mark (Az Mk) disk 09 - gravity station disk 10 - gravity reference mark (RM) disk 11 - magnetic station disk		
	Setting - specific setting entry is required if the Setting Classification Code is 40,41,42,43,44,45 (light structure) or 50,51,52,53,54,55 (massive structure); it is optional otherwise.		
	Setting Classification Code - see footnote. Data Code - preceded and followed by asterisk. (*26* - Setting Classification)		
	Sequence Number Increment by 10 on successive records to allow for insertions.		

nnnnn*26*52/BRIDGE ABUTMENT
 iiiiisiiiiiaa
 0000000011111122222222223333333333444444555555555566666666667777777777
 1234567890123456789012345678901234567890123456789012345678901234567890
 Setting Classification Code: 11-metal rod with base plate, 12-concrete post, 21-25 deep rods,
 31-rock outcrop, 32-boulder, 40-light structure, 50-massive structure - see ANNEX J for others.

28 Stamping Record. Use this record to indicate the stamping or inscription which is peculiar to the bench mark (i.e., exclusive of agency name and other data normally precast on the survey disk). Do not submit this record if no stamping or inscription identifies the BM - see footnote.

00000000111111112222222233333333444444455555556666666777777788888889999999
1234567890123456789012345678901234567890123456789012345678901234567890

Stamping or inscription which identifies the bench mark - must not exceed 50 characters. Do not include agency name or other data which normally appear precast on a survey disk.

Data Code - preceded and followed by asterisk. (*28* - Stamping)

Sequence Number
Increment by 10 on successive records to allow for insertions.

iiiiii*28*H 325 1965 320.695 FT

iiiiiiisaa
00000000111111112222222233333333444444455555556666666777777788888889999999
1234567890123456789012345678901234567890123456789012345678901234567890

NOTE - This record is required if the *27* Monumentation Code is C,D,F, or P; optional otherwise.

30 Descriptive Text Record. Use this record for each line of text of 70 characters or less. Do not divide words between successive records. The entire original or recovery description text must be given as a set of consecutive *30* records constituting a single paragraph of text.

Descriptive Text - enter the full original or recovery description text as a set of consecutive *30* records constituting a single paragraph.

In addition to the usual alphabetic (A-Z) and numeric (0-9) characters, only the following special characters are allowed (see Chapter 5):

- | | |
|-----------------------------|--------------------------|
| (*) asterisk | (+) plus sign |
| () blank or space | (-) minus sign or hyphen |
| (,) comma | (=) equal sign |
| (.) period or decimal point | (/) slash or solidus |
| (\$) dollar sign | (() left parenthesis |
| | () right parenthesis |

Care must be exercised to avoid miskeying the following characters:

- | | | |
|-----------------|----------------|----------------|
| 0-number "zero" | 1-number "one" | 2-number "two" |
| 0-letter "O" | L-letter "L" | Z-letter "Z" |

In addition, the following rules apply:

1. Do not divide words (or other character groups) between successive records.
2. Key two spaces (blanks) following the period before the start of a new sentence.
3. Substitute period (.) or comma (,) for semi-colon (;), as appropriate.
4. Substitute 'AND' (in text) or plus sign (+) (in abbreviation or acronym) for ampersand (&).
5. Substitute two consecutive hyphens (--) without any preceding or following blanks for a colon (:), i.e., key XXXXXX: YYYY as XXXXXX--YYYY.
6. Key dash as space-hyphen-space, i.e., as XXXX - YYYYYY.
7. Key a hyphen (instead of a blank) in an improper (mixed) fraction (e.g. 5-1/2, etc.).
8. Omit (i.e., do not key) any special characters other than those listed above (',",_ etc.).
9. All distance measurements or estimates that are given in metric units must be followed by their English equivalency in parentheses.

Data Code - preceded and followed by asterisk.

Sequence Number

Increment by 10 on successive records to allow for insertions.

*****30*4.85 MILES WEST ALONG STATE HIGHWAY 54 FROM THE SOUTHWARD CHURCH AT
 iiilii
 000000001111111122222222333333334444444455555555666666667777777788
 123456789012345678901234567890123456789012345678901234567890

* * *

40 Concrete Post Record (Optional). Use this record in lieu of the phrase A DISK SET INTO THE TOP OF A CONCRETE POST FLUSH WITH THE GROUND (or PROJECTING/RECESSED x IN (or xx CM depending on Units Code)); this record applies only when Setting Classification Code (data item *26*) is '12'.
 0000000001111122222222233333333334444444445555555556666666667777777778
 1234567890123456789012345678901234567890123456789012345678901234567890

NOTE - Enter the height by which the concrete post projects above the ground (FPR Code P) or the depth to which it is recessed below the ground (FPR Code R) to the nearest inch (Units Code E) or to the nearest centimeter (Units Code M). Leave blank if the FPR Code is F.

Projection or Recess - see NOTE above.
 FPR Code - F-flush, P-projecting, R-recessed.
 Units Code - E-English, M-metric - see footnote.
 Data Code - preceded and followed by asterisk.
 (*40* - Concrete Post Record)

Sequence Number
 Increment by 10 on successive records to allow for insertions.

iiiiiii*40*F
 iiiiiiisaaccbbbbb111112222222233333333334444444445555555556666666667777777778
 0000000001111122222222233333333334444444445555555556666666667777777778
 1234567890123456789012345678901234567890123456789012345678901234567890

NOTE - Leave Units Code blank if the FPR Code is 'F'.

41 Rod/Pipe Record (Optional). Use this record in lieu of the phrase STAINLESS STEEL (or other material as per Setting Code) ROD (or PIPE) SET TO THE DEPTH OF xx FT (or xx.x M depending on Units Code) ENCASED IN A PIPE FLUSH WITH THE GROUND (or PROJECTING/RECESSED x IN (or xx CM)).

00000000111111112222222233333333444444445555555566666666777777778888888899999999
 1234567890123456789012345678901234567890123456789012345678901234567890

Projection or Recess of casing - see NOTE 1 above.	
FPR Code - F-flush, P-projecting, R-recessed.	
Sleeve Depth - in feet (Units Code E) or in meters (Units Code M); leave blank if no sleeve.	
Rod/Pipe Depth - in feet (Units Code E) or in meters (Units Code M).	
Setting Classification Code - see NOTE 2 above.	
Units Code - E-English, M-metric;	
Data Code - preceded and followed by asterisk. (*41* - Rod/Pipe Record)	
Sequence Number	
Increment by 10 on successive records to allow for insertions.	

NOTE 1 - Enter the height by which the surface pipe casing of the rod projects above the ground (FPR Code P) or the depth to which it is recessed below the ground (FPR Code R) to the nearest inch (Units Code E) or to the nearest centimeter (Units Code M).

NOTE 2 - Setting Classification Code specifies the type of rod (or pipe) installation and the material used; it must be same as the Setting Code entered in Data Group *26*. Only the following Setting Codes apply (see ANNEX J):

- 11 - metal rod with base plate
- 13 - shallow-set pipe
- 14 - shallow-set metal rod (without base plate)

- 21 - copper-clad steel rod
- 22 - galvanized steel pipe
- 23 - galvanized steel rod
- 24 - stainless steel rod
- 25 - aluminum alloy rod

- 61 - copper-clad steel rod in sleeve
- 62 - galvanized steel pipe in sleeve
- 63 - galvanized steel rod in sleeve
- 64 - stainless steel rod in sleeve
- 65 - aluminum alloy rod in sleeve

nnnnn*41*22429.0 P20
 iiiiiiisaiiiccccccaccc
 0000000011111111222222333333444444555555666666777777888888999999
 1234567890123456789012345678901234567890123456789012345678901234567890

NOTE - The phrase ..., IN A SLEEVE EXTENDING TO THE DEPTH OF xx FT (or xx.x M depending on Units Code), is inserted before ENCASED ... (see header) whenever the Sleeve Depth field is nonblank.

42 Vertical Reference Record (Optional). Use this record in lieu of the phrase ABOUT LEVEL WITH ... (object specified), or else x FT (or x.x M depending on Units Code) ABOVE (or BELOW) ... (object specified).

00000000011111112222222222333333333344444444445555555555666666666677777777778			
1234567890123456789012345678901234567890123456789012345678901234567890			
	Reference Object - not to exceed 25 characters. Start entry with article (a, an, the) if applicable		
	ABL Code - A-above, B-below, L-about level with.		
	Distance Above or Below the reference object in feet (Units Code E) or in meters (Units Code M).		
	Units Code - E-English, M-metric - see footnote.		
	Data Code - preceded and followed by asterisk. (*42* - Vertical Reference Record)		
	Sequence Number		
	Increment by 10 on successive records to allow for insertions.		
00000000011111112222222222333333333344444444445555555555666666666677777777778		HI	IGHWAY
1234567890123456789012345678901234567890123456789012345678901234567890			

NOTE - Leave Units Code and Distance Above or Below blank if the ABL Code is 'L'.

43 Witness Post Record (Optional). Use this record in lieu of the phrase x.x FT (or x.x M depending on Units Code) xxx (point of compass) FROM A WITNESS POST (or FROM ... (object specified) if other than a witness post).

0000000011111122222222333333334444445555555566666677777777888888999999 1234567890123456789012345678901234567890123456789012345678901234567890	<p>Reference Object (if other than a witness post) - not to exceed 25 characters. Start entry with article (a, an, the) if applicable. If the field is left blank, 'A WITNESS POST' will be supplied automatically.</p> <p>Direction from witness post or reference object - enter the appropriate point of compass.</p> <p>Distance from witness post or reference object in feet (Units Code E) or in meters (Units Code M). Units Code - E-English, M-metric.</p> <p>Data Code - preceded and followed by asterisk. (*43* - Witness Post Record)</p> <p>Sequence Number Increment by 10 on successive records to allow for insertions.</p>	nnnnn*43*E8 NW A TELEPHONE POLE iiiiiiisacc 0000000011111122222222333333334444445555555566666677777777888888999999 1234567890123456789012345678901234567890123456789012345678901234567890
--	---	--

Points of Compass: N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW.

Data Set Termination Record. This must be the last record of every data set submitted.

0000000001111111112222222233333333444444445555555566666666777777778888888899999999
 123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

Job Code - preceded and followed by asterisk.

Sequence Number

Increment by 10 on successive records to allow for insertions.

Data Set Structure: The VERT DESC Data Set is made up of bench mark (BM) data blocks, each containing original description and/or recovery description(s) arranged in sequence by Survey Point Serial Number.

Data Set Identification Record	
Original or Recovery Description	} (if any)
Subsequent Recovery Description	
Original or Recovery Description	} (if any)
Subsequent Recovery Description	
Original or Recovery Description	} (if any)
Subsequent Recovery Description	
Original or Recovery Description	} (if any)
Subsequent Recovery Description	
Original or Recovery Description	} (if any)
Subsequent Recovery Description	
Data Set Termination Record	

*****A*

iiiiisaasbb
 00000000111111112222222233333333444444445555555566666666777777778888888899999999
 123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

ANNEX A

NGS STATE AND COUNTRY CODES

NORTH AMERICA AND GREENLAND

GREENLAND GL

CANADA CD

Provinces and Territories:

Alberta AB	Newfoundland NF	Prince Edward Is PE
British Columbia BC	Northwest Terr's NW	Quebec PQ
Manitoba MB	Nova Scotia NS	Saskatchewan SK
New Brunswick NB	Ontario ON	Yukon Territory YK

UNITED STATES US

States and District of Columbia:

Alabama AL	Kentucky KY	North Dakota ND
Alaska AK	Louisiana LA	Ohio OH
Arizona AZ	Maine ME	Oklahoma OK
Arkansas AR	Maryland MD	Oregon OR
California CA	Massachusetts MA	Pennsylvania PA
Colorado CO	Michigan MI	Rhode Island RI
Connecticut CT	Minnesota MN	South Carolina SC
Delaware DE	Mississippi MS	South Dakota SD
Dist of Columbia DC	Missouri MO	Tennessee TN
Florida FL	Montana MT	Texas TX
Georgia GA	Nebraska NE	Utah UT
Hawaii HI	Nevada NV	Vermont VT
Idaho ID	New Hampshire NH	Virginia VA
Illinois IL	New Jersey NJ	Washington WA
Indiana IN	New Mexico NM	West Virginia WV
Iowa IA	New York NY	Wisconsin WI
Kansas KS	North Carolina NC	Wyoming WY

Other Political Units and Territories:

American Samoa AS	Misc U.S. Caribbean Islands BQ
Canal Zone CZ	Phoenix Islands (Canton Is) CQ
Guam GU	Johnston Atoll JQ
Puerto Rico PR	Midway Islands MQ
Virgin Islands VI	Wake Island WQ
Trust Terr of Pacific Islands (Marianas, Carolines, Marshalls) TQ	

BERMUDA BD

MEXICO MX

CENTRAL AMERICA AND THE CARIBBEAN AREA

BAHAMA ISLANDS	BM	FRENCH ANTILLES	FA
BARBADOS	BB	GUATEMALA	GT
BELIZE (British Honduras) . .	BH	HONDURAS	HO
BRITISH VIRGIN ISLANDS . . .	BV	HAITI	HA
BRITISH WEST INDIES	BI	JAMAICA	JM
CAYMAN ISLANDS	CJ	NETHERLANDS ANTILLES	NA
COLOMBIA	CB	NICARAGUA	NI
COSTA RICA	CR	PANAMA	PN
CUBA	CU	TRINIDAD AND TOBAGO	TD
DOMINICAN REPUBLIC	DR	TURKS AND CAICOS ISLANDS . .	TC
EL SALVADOR	ES	VENEZUELA	VE

OTHER COUNTRIES OR AREAS OF INTEREST TO NGS

ANTARCTICA	AY	LINE ISLANDS (Christmas Is) .	XI
ARGENTINA	AJ	NORWAY	NO
ASCENSION/ST HELENA ISLANDS .	SH	PARAGUAY	PY
BOLIVIA	BL	PERU	PW
BRAZIL	BR	PHILIPPINE ISLANDS	PI
CENTRAL AFRICAN REPUBLIC . . .	CP	SAUDI ARABIA	SA
CHILE	CI	SOUTH AFRICA	SF
ECUADOR	EC	SOVIET UNION	UR
ETHIOPIA	ET	SUDAN	SU
FRENCH GUIANA	FG	SURINAM (Dutch Guiana) . . .	DG
FRENCH SOMALILAND	FS	TANZANIA	TZ
GILBERT AND ELLICE ISLANDS .	GE	TRISTAN DA CUNHA ISLANDS . .	TR
GUYANA (British Guiana) . . .	BG	UGANDA	UG
ICELAND	IC	UNITED ARAB REPUBLIC	
ITALY	IT	(Egypt)	EG
JAPAN	JA	URUGUAY	UY
		ZAMBIA	ZA

ANNEX C

CONTRIBUTORS OF GEODETIC CONTROL DATA

This ANNEX contains a list of organizations which have contributed (or are expected to contribute) data resulting from geodetic control established to extend and/or densify the national horizontal and vertical geodetic control networks.

A unique six-character identification symbol has been assigned to each organization listed. As far as possible, this symbol is identical to the commonly used abbreviation or acronym of the respective organization. However, to insure uniqueness, modifications of the commonly used abbreviations and acronyms, as well as arbitrary symbols, had to be assigned in many cases. Organizations not listed in this ANNEX may contact the National Geodetic Survey (see ANNEX K) to have a unique identification symbol assigned.

The abbreviation or acronym of the organization whose name is precast in the monument should be included as part of the designation (except for NGS, NOS, or C&GS). For marks not having a precast agency name: if the agency that set the mark is known, append that agency's acronym or abbreviation. The abbreviation or acronym to be used for this purpose should be:

a. The identification symbols listed in this ANNEX, except for county and city agencies.

b. For county and city agencies, an appropriate and intelligible acronym or abbreviation (e.g., K CO for King County, C of R for the City of Richmond, etc.).

Note: For organizations not listed in this ANNEX, append the acronym or abbreviation commonly used to refer to the organization, or as specified by the organization itself. For state, commonwealth, or territorial organizations, the first two letters of the acronym or abbreviation must be the standard two-letter abbreviations listed in ANNEX A.

In addition to the six-character unique identification symbol, a 20-character standard abbreviated name is also given for each organization listed. The respective organizations are grouped under 13 categories, and within each category they are listed in the alphabetic order of their identification symbols. The 13 categories are given in an index which appears on the following page.

<u>CATEGORIES OF CONTRIBUTORS OF GEODETIC CONTROL DATA</u>	<u>PAGE</u>
a. International and Foreign Government Agencies	C-3
b. Federal and Interstate Agencies	C-3
c. State, Commonwealth, and Territorial Agencies	C-4
d. County Agencies	C-7
e. City Agencies	C-10
f. Public Inter-City and Regional Agencies	C-14
g. Railroads	C-14
h. Petroleum and Pipeline Companies	C-16
i. Gas and Electric Utility Companies	C-17
j. Surveying and Construction Industry	C-17
k. Miscellaneous Commercial Organizations and Private Firms	C-19
l. Academic Institutions and Amateur Organizations	C-20
m. General Non-Specific Designators	C-21

CONVENTIONS USED IN THE FORMATION OF IDENTIFICATION SYMBOLS

a. State, Commonwealth, and Territorial Agencies: The six-character identification symbol of a state, commonwealth, or territorial agency consists of the respective two-character state code (see ANNEX A) to which up to four letters (e.g. the initials of the agency's name) may be appended. In general, "S" for "state" and "O" for "of" should be omitted.

b. County Agencies: The six-character identification symbol of a county agency consists of the two-character code denoting the state in which the county is located (see ANNEX A) followed by a hyphen and by a three-digit number which has been assigned to the respective county in Worldwide Geographic Location Codes prepared by the Office of Finance, General Services Administration (GSA), November 1976. Agencies which do not have access to this publication may contact the National Geodetic Survey (see ANNEX K) to obtain the appropriate county code.

c. City Agencies: The six-character identification symbol of a city agency consists of the two-character code denoting the state in which the city is located (see ANNEX A) followed by a four-digit number which has been assigned to the respective city in Worldwide Geographic Location Codes prepared by the Office of Finance, General Services Administration (GSA), November 1976. Agencies which do not have access to this publication may contact the National Geodetic Survey (see ANNEX K) to obtain the appropriate city code.

NOTE: For the purposes of this ANNEX, agencies of independent cities which are also counties or county-equivalents should be considered to be city (rather than county) agencies and assigned identification symbol accordingly.

NOTE - AGENCY SYMBOLS LISTED HEREIN ARE FOR NGS INTERNAL USE ONLY
 AGENCY ABBREVIATIONS IN STATION NAMES SHOULD BE RETAINED AS GIVEN

INTERNATIONAL AND FOREIGN GOVERNMENT AGENCIES

SYMBOL	STANDARD ABBREV NAME	FULL NAME
DTENAL	DETENAL DE MEXICO	ESTUDIOS DEL TERRITORIO NACIONAL DE MEXICO
GSC	GEOD SURV OF CANADA	GEODETIC SURVEY OF CANADA
IAGS	INTER AMER GEOD SURV	INTER AMERICAN GEODETIC SURVEY
IBC	INT BOUNDARY COMM	INTERNATIONAL BOUNDARY COMMISSION
IBWC	INT BDRY WTR COMM	INTERNATIONAL BOUNDARY AND WATER COMMISSION
ONCADH	ONTARIO DEPT OF HIGH	ONTARIO CANADA DEPARTMENT OF HIGHWAYS
PICGS	PI C AND G SURVEY	PHILIPPINE COAST AND GEODETIC SURVEY

FEDERAL AND INTERSTATE AGENCIES

SYMBOL	STANDARD ABBREV NAME	FULL NAME
AEC	ATOMIC ENERGY COMM	ATOMIC ENERGY COMMISSION (NOW ERDA)
AMS	ARMY MAP SERVICE	US ARMY MAP SERVICE (NOW DMA)
BLM	BUR OF LAND MGT	US BUREAU OF LAND MANAGEMENT
BOF	BUR OF FISHERIES	US BUREAU OF COMMERCIAL FISHERIES
BOM	BUR OF MINES	US BUREAU OF MINES
BOR	BUR OF RECLAMATION	US BUREAU OF RECLAMATION (NOW WPRS)
BPA	BONNEVILLE PWR ADMIN	BONNEVILLE POWER ADMINISTRATION
BPR	BUR OF PUBLIC ROADS	US BUREAU OF PUBLIC ROADS
CAB	CIVIL AERONAUT BOARD	CIVIL AERONAUTICS BOARD
CGS	COAST AND GEOD SURV	US COAST AND GEODETIC SURVEY (NOW NOS)
DI	DEPT OF INTERIOR	US DEPARTMENT OF INTERIOR
DMA	DEFENSE MAP AGENCY	DEFENSE MAPPING AGENCY
DOD	DEPT OF DEFENSE	US DEPARTMENT OF DEFENSE
FAA	FDRL AVIATION ADMIN	FEDERAL AVIATION ADMINISTRATION
IRC	ILLINOIS RIVER COMM	ILLINOIS RIVER COMMISSION
MORC	MISSOURI RIVER COMM	MISSOURI RIVER COMMISSION
MRC	MISS RIVER COMM	MISSISSIPPI RIVER COMMISSION
NASA	NAT AERO SPACE ADMIN	NATIONAL AERONAUTICS AND SPACE ADMIN
NBS	NAT BUR OF STANDARDS	NATIONAL BUREAU OF STANDARDS
NGS	NAT GEODETIC SURVEY	NATIONAL GEODETIC SURVEY
NIH	NAT INST OF HEALTH	NATIONAL INSTITUTES OF HEALTH
NMTXBC	NM TX BOUNDARY COMM	NEW MEXICO AND TEXAS BOUNDARY COMMISSION
NOS	NAT OCEAN SURVEY	NATIONAL OCEAN SURVEY
NOSAMC	NOS ATLAN MARINE CTR	NOS ATLANTIC MARINE CENTER
NOSPMC	NOS PACIF MARINE CTR	NOS PACIFIC MARINE CENTER
NPS	NAT PARK SERVICE	NATIONAL PARK SERVICE
NSL	NAVY STANDARDS LAB	US NAVY STANDARDS LABORATORY AT POMONA
PBPP	PUB BLDGS AND PARKS	OFFICE OF PUBLIC BUILDINGS AND PUBLIC PARKS
SCS	SOIL CONSERV SERVICE	SOIL CONSERVATION SERVICE
TPC	USATOPOCOM	US ARMY TOPOGRAPHIC COMMAND (NOW DMA)
TVA	TENN VALLEY AUTH	TENNESSEE VALLEY AUTHORITY
USA	US ARMY	US ARMY

FEDERAL AND INTERSTATE AGENCIES - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
USAF	US AIR FORCE	US AIR FORCE
USCG	US COAST GUARD	US COAST GUARD
USDA	DEPT OF AGRICULTURE	US DEPARTMENT OF AGRICULTURE
USDWC	US DEEP WTRWAY COMM	US DEEP WATERWAY COMMISSION
USE	US ENGINEERS	US ARMY CORPS OF ENGINEERS
USFS	US FOREST SERVICE	US FOREST SERVICE
USFWA	FEDERAL WORKS AGENCY	US FEDERAL WORKS AGENCY
USFWS	FISH AND WILDLIFE	US FISH AND WILDLIFE SERVICE
USGLO	US GOVT LAND OFFICE	US GOVERNMENT LAND OFFICE
USGS	US GEOLOGICAL SURVEY	US GEOLOGICAL SURVEY
USGS-E	USGS EASTERN MAP CTR	USGS EASTERN MAPPING CENTER
USGS-M	USGS MIDCONT MAP CTR	USGS MID-CONTINENT MAPPING CENTER
USGS-R	USGS ROCKYMT MAP CTR	USGS ROCKY MOUNTAIN MAPPING CENTER
USGS-W	USGS WESTERN MAP CTR	USGS WESTERN MAPPING CENTER
USLHS	US LIGHTHSE SERVICE	US LIGHTHOUSE SERVICE (NOW USCG)
USLS	US LAKE SURVEY	US LAKE SURVEY
USMC	US MARINE CORPS	US MARINE CORPS
USN	US NAVY	US NAVY
USPS	US POSTAL SERVICE	US POSTAL SERVICE
USSC	US SUPREME COURT	US SUPREME COURT
USTD	US TREASURY DEPT	US TREASURY DEPARTMENT
USWB	US WEATHER BUREAU	US WEATHER BUREAU (NOW NWS)
WPRS	WATER AND POWER RES	US WATER AND POWER RESOURCES SERVICE
*****	*****	*****

STATE, COMMONWEALTH, AND TERRITORIAL AGENCIES

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
AKDAVI	AK DIV OF AVIATION	ALASKA DIVISION OF AVIATION
AKHD	AK HIGHWAY DEPT	ALASKA HIGHWAY DEPARTMENT
AKPWR	AK POWER ADMIN	ALASKA POWER ADMINISTRATION
ALGS	AL GEODETIC SURVEY	ALABAMA GEODETIC SURVEY
ALHD	AL HIGHWAY DEPT	STATE OF ALABAMA HIGHWAY DEPARTMENT
ARGLS	AR GEOLOGICAL SURVEY	ARKANSAS GEOLOGICAL SURVEY
ARGS	AR GEODETIC SURVEY	ARKANSAS GEODETIC SURVEY
ARHD	AR HIGHWAY DEPT	ARKANSAS STATE HIGHWAY DEPARTMENT
AZDT	AZ DEPT OF TRANSP	ARIZONA DEPARTMENT OF TRANSPORTATION
AZHD	AZ HIGHWAY DEPT	ARIZONA HIGHWAY DEPARTMENT (NOW AZDT)
CADH	CA DIV OF HIGHWAYS	CALIFORNIA DIVISION OF HIGHWAYS (NOW CADT)
CADPW	CA DEPT OF PUB WORKS	CALIFORNIA DEPARTMENT OF PUBLIC WORKS
CADT	CA DEPT OF TRANSP	CALIFORNIA DEPARTMENT OF TRANSPORTATION
CADWR	CA DEPT OF WATER RES	CALIFORNIA DEPARTMENT OF WATER RESOURCES
CAEC	CA EARTHQUAKE COMM	CALIFORNIA EARTHQUAKE COMMISSION
CAGS	CA GEODETIC SURVEY	CALIFORNIA GEODETIC SURVEY
CASLC	CA STATE LANDS COMM	CALIFORNIA STATE LANDS COMMISSION
CASPC	CA STATE PARKS COMM	CALIFORNIA STATE PARKS COMMISSION
CODH	CO DEPT OF HIGHWAYS	COLORADO STATE DEPARTMENT OF HIGHWAYS
COGS	CO GEODETIC SURVEY	COLORADO GEODETIC SURVEY
CTCSF	CT COMM SHELL FISH	CONNECTICUT COMMISSION OF SHELL FISHERIES
CTDT	CT DEPT OF TRANSP	CONNECTICUT DEPARTMENT OF TRANSPORTATION
CTGS	CT GEODETIC SURVEY	CONNECTICUT GEODETIC SURVEY
*****	*****	*****

STATE, COMMONWEALTH, AND TERRITORIAL AGENCIES - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
DCDHT	DC DEPT OF HIGHWAYS	DC DEPARTMENT OF HIGHWAYS AND TRAFFIC
DEDHT	DE DEPT OF HIGHWAYS	DELAWARE DEPARTMENT OF HIGHWAYS AND TRANSP
FLDNR	FL DEPT OF NAT RES	FLORIDA DEPARTMENT OF NATURAL RESOURCES
FLDPW	FL DEPT OF PUB WORKS	FLORIDA DEPARTMENT OF PUBLIC WORKS
FLDT	FL DEPT OF TRANSP	FLORIDA DEPARTMENT OF TRANSPORTATION
FLGS	FL GEODETIC SURVEY	FLORIDA GEODETIC SURVEY
FLHD	FL HIGHWAY DEPT	FLORIDA HIGHWAY DEPARTMENT (NOW FLDT)
GADT	GA DEPT OF TRANSP	GEORGIA DEPARTMENT OF TRANSPORTATION
GAGS	GA GEODETIC SURVEY	GEORGIA GEODETIC SURVEY
GAHD	GA HIGHWAY DEPT	GEORGIA HIGHWAY DEPARTMENT (NOW GADT)
HIDT	HI DEPT OF TRANSP	HAWAII DEPARTMENT OF TRANSPORTATION
HIGS	HI GEODETIC SURVEY	HAWAII GEODETIC SURVEY
HITS	HI TERRIT SURVEY	HAWAII TERRITORIAL SURVEY
IAHD	IA HIGHWAY DEPT	IOWA HIGHWAY DEPARTMENT
IDDH	ID DEPT OF HIGHWAYS	IDAHO DEPARTMENT OF HIGHWAYS (NOW IDDT)
IDDT	ID DEPT OF TRANSP	IDAHO DEPARTMENT OF TRANSPORTATION
IDGS	ID GEODETIC SURVEY	IDAHO GEODETIC SURVEY
IDPWD	ID DEPT OF PUB WORKS	IDAHO DEPARTMENT OF PUBLIC WORKS
ILDPW	IL DEPT OF PUB WORKS	ILLINOIS DEPARTMENT OF PUBLIC WORKS
ILDT	IL DEPT OF TRANSP	ILLINOIS DEPARTMENT OF TRANSPORTATION
ILDW	IL DIV OF WATERWAYS	ILLINOIS DIVISION OF WATERWAYS
ILGS	IL GEODETIC SURVEY	ILLINOIS GEODETIC SURVEY
ILHD	IL HIGHWAY DEPT	ILLINOIS HIGHWAY DEPARTMENT (NOW ILDT)
ILSC	IL SANITARY COMM	ILLINOIS SANITARY COMMISSION
INDNR	IN DEPT OF NAT RES	INDIANA DEPARTMENT OF NATURAL RESOURCES
INFCC	IN FLOOD CONTR COMM	INDIANA FLOOD CONTROL AND WATER RES COMM
INGS	IN GEODETIC SURVEY	INDIANA GEODETIC SURVEY
INHJ	IN HIGHWAY DEPT	INDIANA HIGHWAY DEPARTMENT
IOWAGS	IA GEODETIC SURVEY	IOWA GEODETIC SURVEY
KSDT	KS DEPT OF TRANSP	KANSAS DEPARTMENT OF TRANSPORTATION
KSGS	KS GEODETIC SURVEY	KANSAS GEODETIC SURVEY
KSHC	KS HIGHWAY COMM	STATE HIGHWAY COMM OF KANSAS (NOW KSDT)
KSWRB	KS WATER RES BOARD	KANSAS WATER RESOURCES BOARD
KYDT	KY DEPT OF TRANSP	KENTUCKY DEPARTMENT OF TRANSPORTATION
KYGS	KY GEODETIC SURVEY	KENTUCKY GEODETIC SURVEY
KYHD	KY HIGHWAY DEPT	KENTUCKY STATE HIGHWAY DEPARTMENT (NOW KYDT)
LADH	LA DEPT OF HIGHWAYS	LOUISIANA DEPARTMENT OF HIGHWAYS (NOW LADTD)
LADTD	LA TRANSP AND DEV	LOUISIANA DEPT OF TRANSP AND DEVELOPMENT
LAGS	LA GEODETIC SURVEY	LOUISIANA GEODETIC SURVEY
LASCC	LA CONSERVATION COMM	LOUISIANA STATE CONSERVATION COMMISSION
LAWRRI	LA WATER RES INST	LOUISIANA WATER RESOURCE RESEARCH INSTITUTE
MADLH	MA DEPT LAND-HARBORS	MASSACHUSETTS DEPARTMENT OF LAND AND HARBORS
MADPW	MA DEPT OF PUB WORKS	MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS
MAGS	MA GEODETIC SURVEY	MASSACHUSETTS GEODETIC SURVEY
MDBCMS	MD BUR SURV AND MAPS	MARYLAND BUREAU OF CONTROL SURVEYS AND MAPS
MDDT	MD DEPT OF TRANSP	MARYLAND DEPARTMENT OF TRANSPORTATION
MDGS	MD GEODETIC SURVEY	MARYLAND GEODETIC SURVEY
MDSFC	MD SHELL FISH COMM	MARYLAND SHELL FISHERIES COMMISSION
MDSRC	MD STATE ROADS COMM	MARYLAND STATE ROADS COMMISSION (NOW MDDT)
MEDT	ME DEPT OF TRANSP	MAINE DEPARTMENT OF TRANSPORTATION
MEGS	ME GEODETIC SURVEY	MAINE GEODETIC SURVEY
MEHD	ME HIGHWAY DEPT	MAINE HIGHWAY DEPARTMENT (NOW MEDT)
MEPUC	ME PUB UTIL COMM	MAINE PUBLIC UTILITIES COMMISSION
*****	*****	*****

STATE, COMMONWEALTH, AND TERRITORIAL AGENCIES - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
MIDH	MI DEPT OF HIGHWAYS	MICHIGAN DEPT OF STATE HIGHWAYS AND TRANSP
MIDNR	MI DEPT OF NAT RES	MICHIGAN DEPARTMENT OF NATURAL RESOURCES
MIGS	MI GEODETIC SURVEY	MICHIGAN GEODETIC SURVEY
MNDT	MN DEPT OF TRANSP	MINNESOTA DEPARTMENT OF TRANSPORTATION
MNGS	MN GEODETIC SURVEY	MINNESOTA GEODETIC SURVEY
MNHD	MN HIGHWAY DEPT	MINNESOTA HIGHWAY DEPARTMENT (NOW MNDT)
MOGS	MO GEODETIC SURVEY	MISSOURI GEODETIC SURVEY
MOHC	MO HIGHWAY COMM	MISSOURI STATE HIGHWAY COMMISSION
MSGS	MS GEODETIC SURVEY	MISSISSIPPI GEODETIC SURVEY
MSHD	MS HIGHWAY DEPT	MISSISSIPPI STATE HIGHWAY DEPARTMENT
MTBOR	MT BUR OF PUB ROADS	MONTANA BUREAU OF PUBLIC ROADS
MTDH	MT DEPT OF HIGHWAYS	MONTANA DEPARTMENT OF HIGHWAYS
MTGS	MT GEODETIC SURVEY	MONTANA GEODETIC SURVEY
MTSHC	MT HIGHWAY COMM	MONTANA STATE HIGHWAY COMMISSION
NCDF	NC DIV OF FORESTRY	NORTH CAROLINA DIVISION OF FORESTRY
NCDOT	NC DOT DIV OF HWYS	NORTH CAROLINA DEPT OF TRANS DIV OF HWYWS
NCGS	NC GEODETIC SURVEY	NORTH CAROLINA GEODETIC SURVEY
NCHPWC	NC HWY AND P W COMM	NORTH CAROLINA HIGHWAY AND PUBLIC WORKS COMM
NDGS	ND GEODETIC SURVEY	NORTH DAKOTA GEODETIC SURVEY
NDHD	ND HIGHWAY DEPT	NORTH DAKOTA HIGHWAY DEPARTMENT
NDWC	ND WATER COMMISSION	NORTH DAKOTA WATER COMMISSION
NEDR	NE DEPT OF ROADS	NEBRASKA DEPARTMENT OF ROADS
NEGS	NE GEODETIC SURVEY	NEBRASKA GEODETIC SURVEY
NHDPW	NH DEPT OF PUB WORKS	NEW HAMPSHIRE DEPARTMENT OF PUBLIC WORKS
NHGS	NH GEODETIC SURVEY	NEW HAMPSHIRE GEODETIC SURVEY
NHHD	NH HIGHWAY DEPT	NEW HAMPSHIRE HIGHWAY DEPARTMENT
NJBCN	NJ BOARD OF COMMERCE	NEW JERSEY BOARD OF COMMERCE AND NAVIGATION
NJDCED	NJ CONS AND ECON DEV	NEW JERSEY DEPT OF CONSERVATION AND ECON DEV
NJDT	NJ DEPT OF TRANSP	NEW JERSEY DEPARTMENT OF TRANSPORTATION
NJGS	NJ GEODETIC SURVEY	NEW JERSEY GEODETIC SURVEY
NMGS	NM GEODETIC SURVEY	NEW MEXICO GEODETIC SURVEY
NMHD	NM HIGHWAY DEPT	NEW MEXICO STATE HIGHWAY DEPARTMENT
NVDH	NV DEPT OF HIGHWAYS	NEVADA DEPARTMENT OF HIGHWAYS
NVGS	NV GEODETIC SURVEY	NEVADA GEODETIC SURVEY
NYDPW	NY DEPT OF PUB WORKS	NEW YORK STATE DEPARTMENT OF PUBLIC WORKS
NYDT	NY DEPT OF TRANSP	NEW YORK STATE DEPARTMENT OF TRANSPORTATION
NYGS	NY GEODETIC SURVEY	NEW YORK GEODETIC SURVEY
NYHD	NY DEPT OF HIGHWAYS	NEW YORK DEPARTMENT OF HIGHWAYS (NOW NYDT)
NYLISP	NY LONG ISLAND SPA	NEW YORK LONG ISLAND STATE PARK AUTHORITY
NYNPA	NY NIAGARA PWR AUTH	NEW YORK NIAGARA POWER AUTHORITY
NYSS	NY STATE SURVEY	NEW YORK STATE SURVEY
OHDT	OH DEPT OF TRANSP	OHIO DEPARTMENT OF TRANSPORTATION
OHGS	OH GEODETIC SURVEY	OHIO GEODETIC SURVEY
OHHD	OH HIGHWAY DEPT	OHIO HIGHWAY DEPARTMENT (NOW OHDT)
OKCC	OK CONSERVATION COMM	OKLAHOMA CONSERVATION COMMISSION
OKDH	OK DEPT OF HIGHWAYS	OKLAHOMA DEPARTMENT OF HIGHWAYS
OKGS	OK GEODETIC SURVEY	OKLAHOMA GEODETIC SURVEY
ORDT	OR DEPT OF TRANSP	OREGON DEPARTMENT OF TRANSPORTATION
ORGS	OR GEODETIC SURVEY	OREGON GEODETIC SURVEY
ORHD	OR HIGHWAY DEPT	OREGON STATE HIGHWAY DEPARTMENT (NOW ORDT)
ORSLB	OR STATE LAND BOARD	OREGON STATE LAND BOARD
PADFW	PA DEPT FORESTS WTRS	PENNSYLVANIA DEPT OF FORESTS AND WATERS
PADH	PA DEPT OF HIGHWAYS	PENNSYLVANIA DEPT OF HIGHWAYS (NOW PADT)
*****	*****	*****

STATE, COMMONWEALTH, AND TERRITORIAL AGENCIES - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
PADT	PA DEPT OF TRANSP	PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
PAGS	PA GEODETIC SURVEY	PENNSYLVANIA GEODETIC SURVEY
RIBPR	RI BUR OF PUB ROADS	RHODE ISLAND BUREAU OF PUBLIC ROADS
RIGS	RI GEODETIC SURVEY	RHODE ISLAND GEODETIC SURVEY
SCGS	SC GEODETIC SURVEY	SOUTH CAROLINA GEODETIC SURVEY
SCHD	SC HIGHWAY DEPT	SOUTH CAROLINA STATE HIGHWAY DEPARTMENT
SDDT	SD DEPT OF TRANSP	SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION
SDHD	SD HIGHWAY DEPT	SOUTH DAKOTA HIGHWAY DEPARTMENT (NOW SDDT)
TNDG	TN DIV OF GEOLOGY	TENNESSEE DIVISION OF GEOLOGY
TNDT	TN DEPT OF TRANSP	TENNESSEE DEPARTMENT OF TRANSPORTATION
TNGS	TN GEODETIC SURVEY	TENNESSEE GEODETIC SURVEY
TNHD	TN HIGHWAY DEPT	TENNESSEE HIGHWAY DEPARTMENT (NOW TNDT)
TXGS	TX GEODETIC SURVEY	TEXAS GEODETIC SURVEY
TXHD	TX HIGHWAY DEPT	TEXAS HIGHWAY DEPARTMENT
TXRD	TX RECLAMATION DEPT	TEXAS RECLAMATION DEPARTMENT
UTDH	UT DEPT OF HIGHWAYS	UTAH STATE DEPARTMENT OF HIGHWAYS
VACF	VA COMM OF FISHERIES	VIRGINIA COMMISSION OF FISHERIES
VADH	VA DEPT OF HIGHWAYS	VIRGINIA DEPARTMENT OF HIGHWAYS
VAGS	VA GEODETIC SURVEY	VIRGINIA GEODETIC SURVEY
VTAT	VT AGENCY OF TRANSP	VERMONT AGENCY OF TRANSPORTATION
VTDH	VT DEPT OF HIGHWAYS	VERMONT DEPARTMENT OF HIGHWAYS (NOW VTAT)
VTFS	VT FOREST SERVICE	VERMONT FOREST SERVICE
VTGS	VT GEODETIC SURVEY	VERMONT GEODETIC SURVEY
WADNR	WA DEPT OF NAT RES	WASHINGTON DEPARTMENT OF NATURAL RESOURCES
WADPL	WA DEPT OF PUB LANDS	WASHINGTON STATE DEPARTMENT OF PUBLIC LANDS
WAGS	WA GEODETIC SURVEY	WASHINGTON GEODETIC SURVEY
WAHC	WA HIGHWAY COMM	WASHINGTON STATE HIGHWAY COMMISSION
WATBA	WA TOLL BRIDGE AUTH	WASHINGTON STATE TOLL BRIDGE AUTHORITY
WIDNR	WI DEPT OF NAT RES	WISCONSIN DEPARTMENT OF NATURAL RESOURCES
WIDT	WI DEPT OF TRANSP	WISCONSIN DEPARTMENT OF TRANSPORTATION
WIGS	WI GEODETIC SURVEY	WISCONSIN GEODETIC SURVEY
WIHD	WI HIGHWAY DEPT	WISCONSIN HIGHWAY DEPARTMENT (NOW WIDT)
WIPSC	WI PUB SERVICE COMM	WISCONSIN PUBLIC SERVICE COMMISSION
WIRRC	WI RAILROAD COMM	WISCONSIN RAILROAD COMMISSION
WVGS	WV GEODETIC SURVEY	WEST VIRGINIA GEODETIC SURVEY
WVHD	WV HIGHWAY DEPT	WEST VIRGINIA HIGHWAY DEPARTMENT
WYHD	WY HIGHWAY DEPT	WYOMING HIGHWAY DEPARTMENT
*****	*****	*****

COUNTY AGENCIES

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
AL-107	PICKENS CO	PICKENS COUNTY ALABAMA
AL-119	SUMTER CO	SUMTER COUNTY ALABAMA
CA-001	ALAMEDA CO	ALAMEDA COUNTY CALIFORNIA
CA-013	CONTRA COSTA CO	CONTRA COSTA COUNTY CALIFORNIA
CA-019	FRESNO CO	FRESNO COUNTY CALIFORNIA
CA-023	HUMBOLDT CO	HUMBOLDT COUNTY CALIFORNIA
CA-025	IMPERIAL CO	IMPERIAL COUNTY CALIFORNIA
CA-027	INYO CO	INYO COUNTY CALIFORNIA
CA-029	KERN CO	KERN COUNTY CALIFORNIA
*****	*****	*****

COUNTY AGENCIES - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
CA-031	KINGS CO	KINGS COUNTY CALIFORNIA
CA-033	LAKE CO	LAKE COUNTY CALIFORNIA
CA-037	LOS ANGELES CO	LOS ANGELES COUNTY CALIFORNIA
CA-041	MARIN CO	MARIN COUNTY CALIFORNIA
CA-043	MARIPOSA CO	MARIPOSA COUNTY CALIFORNIA
CA-045	MENDOCINO CO	MENDOCINO COUNTY CALIFORNIA
CA-051	MONO CO	MONO COUNTY CALIFORNIA
CA-053	MONTEREY CO	MONTEREY COUNTY CALIFORNIA
CA-055	NAPA CO	NAPA COUNTY CALIFORNIA
CA-059	ORANGE CO	ORANGE COUNTY CALIFORNIA
CA-063	PLUMAS CO	PLUMAS COUNTY CALIFORNIA
CA-065	RIVERSIDE CO	RIVERSIDE COUNTY CALIFORNIA
CA-067	SACRAMENTO CO	SACRAMENTO COUNTY CALIFORNIA
CA-069	SAN BENITO CO	SAN BENITO COUNTY CALIFORNIA
CA-071	SAN BERNARDINO CO	SAN BERNARDINO COUNTY CALIFORNIA
CA-073	SAN DIEGO CO	SAN DIEGO COUNTY CALIFORNIA
CA-075	SAN FRANCISCO CO	SAN FRANCISCO COUNTY CALIFORNIA
CA-077	SAN JOAQUIN CO	SAN JOAQUIN COUNTY CALIFORNIA
CA-079	SAN LUIS OBISPO CO	SAN LUIS OBISPO COUNTY CALIFORNIA
CA-081	SAN MATEO CO	SAN MATEO COUNTY CALIFORNIA
CA-083	SANTA BARBARA CO	SANTA BARBARA COUNTY CALIFORNIA
CA-087	SANTA CRUZ CO	SANTA CRUZ COUNTY CALIFORNIA
CA-089	SHASTA CO	SHASTA COUNTY CALIFORNIA
CA-091	SIERRA CO	SIERRA COUNTY CALIFORNIA
CA-093	SISKIYOU CO	SISKIYOU COUNTY CALIFORNIA
CA-097	SONOMA CO	SONOMA COUNTY CALIFORNIA
CA-099	STANISLAUS CO	STANISLAUS COUNTY CALIFORNIA
CA-103	TEHAMA CO	TEHAMA COUNTY CALIFORNIA
CA-105	TRINITY CO	TRINITY COUNTY CALIFORNIA
CA-107	TULARE CO	TULARE COUNTY CALIFORNIA
CA-109	TUOLUMNE CO	TUOLUMNE COUNTY CALIFORNIA
CA-111	VENTURA CO	VENTURA COUNTY CALIFORNIA
CA-113	YOLO CO	YOLO COUNTY CALIFORNIA
CO-017	CHEYENNE CO	CHEYENNE COUNTY COLORADO
CO-061	KIOWA CO	KIOWA COUNTY COLORADO
FL-011	BROWARD CO	BROWARD COUNTY FLORIDA
FL-025	DADE CO	DADE COUNTY FLORIDA
FL-053	HERNANDO CO	HERNANDO COUNTY FLORIDA
FL-057	HILLSBOROUGH CO	HILLSBOROUGH COUNTY FLORIDA
FL-071	LEE CO	LEE COUNTY FLORIDA
FL-081	MANATEE CO	MANATEE COUNTY FLORIDA
FL-099	PALM BEACH CO	PALM BEACH COUNTY FLORIDA
FL-101	PASCO CO	PASCO COUNTY FLORIDA
FL-103	PINELLAS CO	PINELLAS COUNTY FLORIDA
FL-131	WALTON CO	WALTON COUNTY FLORIDA
IA-105	JONES CO	JONES COUNTY IOWA
IA-113	LINN CO	LINN COUNTY IOWA
IA-159	RINGGOLD CO	RINGGOLD COUNTY IOWA
IA-165	SHELBY CO	SHELBY COUNTY IOWA
IL-031	COOK CO	COOK COUNTY ILLINOIS
IL-051	FAYETTE CO	FAYETTE COUNTY ILLINOIS
IL-103	LEE CO	LEE COUNTY ILLINOIS
IL-163	ST CLAIR CO	ST CLAIR COUNTY ILLINOIS
*****	*****	*****

COUNTY AGENCIES - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
IL-195	WHITESIDE CO	WHITESIDE COUNTY ILLINOIS
IN-003	ALLEN CO	ALLEN COUNTY INDIANA
IN-039	ELKHART CO	ELKHART COUNTY INDIANA
IN-085	KOSCIUSKO CO	KOSCIUSKO COUNTY INDIANA
IN-127	PORTER CO	PORTER COUNTY INDIANA
IN-131	PULASKI CO	PULASKI COUNTY INDIANA
IN-141	ST JOSEPH CO	ST JOSEPH COUNTY INDIANA
KS-189	STEVENS CO	STEVENS COUNTY KANSAS
KS-203	WICHITA CO	WICHITA COUNTY KANSAS
LA-033	EAST BATON ROUGE PAR	EAST BATON ROUGE PARISH LOUISIANA
MD-021	FREDERICK CO	FREDERICK COUNTY MARYLAND
MD-043	WASHINGTON CO	WASHINGTON COUNTY MARYLAND
ME-007	FRANKLIN CO	FRANKLIN COUNTY MAINE
MI-005	ALLEGAN CO	ALLEGAN COUNTY MICHIGAN
MI-011	ARENAC CO	ARENAC COUNTY MICHIGAN
MI-033	CHIPPEWA CO	CHIPPEWA COUNTY MICHIGAN
MI-053	GOGEBIC CO	GOGEBIC COUNTY MICHIGAN
MI-061	HOUGHTON CO	HOUGHTON COUNTY MICHIGAN
MI-063	HURON CO	HURON COUNTY MICHIGAN
MI-075	JACKSON CO	JACKSON COUNTY MICHIGAN
MI-081	KENT CO	KENT COUNTY MICHIGAN
MI-125	OAKLAND CO	OAKLAND COUNTY MICHIGAN
MI-163	WAYNE CO	WAYNE COUNTY MICHIGAN
MN-061	ITASCA CO	ITASCA COUNTY MINNESOTA
MS-135	TALLAHATCHIE CO	TALLAHATCHIE COUNTY MISSISSIPPI
MS-145	UNION CO	UNION COUNTY MISSISSIPPI
ND-057	MERCER CO	MERCER COUNTY NORTH DAKOTA
NJ-017	HUDSON CO	HUDSON COUNTY NEW JERSEY
NV-027	PERSHING CO	PERSHING COUNTY NEVADA
NY-023	CORTLAND CO	CORTLAND COUNTY NEW YORK
NY-025	DELAWARE CO	DELAWARE COUNTY NEW YORK
NY-055	MONROE CO	MONROE COUNTY NEW YORK
NY-057	MONTGOMERY CO	MONTGOMERY COUNTY NEW YORK
NY-059	NASSAU CO	NASSAU COUNTY NEW YORK
NY-065	ONEIDA CO	ONEIDA COUNTY NEW YORK
NY-069	ONTARIO CO	ONTARIO COUNTY NEW YORK
NY-091	SARATOGA CO	SARATOGA COUNTY NEW YORK
NY-103	SUFFOLK CO	SUFFOLK COUNTY NEW YORK
NY-111	ULSTER CO	ULSTER COUNTY NEW YORK
NY-119	WESTCHESTER CO	WESTCHESTER COUNTY NEW YORK
OH-051	FULTON CO	FULTON COUNTY OHIO
OH-095	LUCAS CO	LUCAS COUNTY OHIO
OH-099	MAHONING CO	MAHONING COUNTY OHIO
OH-113	MONTGOMERY CO	MONTGOMERY COUNTY OHIO
OH-133	PORTAGE CO	PORTAGE COUNTY OHIO
OH-151	STARK CO	STARK COUNTY OHIO
OK-133	SEMINOLE CO	SEMINOLE COUNTY OKLAHOMA
OR-017	DESCHUTES CO	DESCHUTES COUNTY OREGON
OR-019	DOUGLAS CO	DOUGLAS COUNTY OREGON
OR-029	JACKSON CO	JACKSON COUNTY OREGON
OR-039	LANE CO	LANE COUNTY OREGON
PA-003	ALLEGHENY CO	ALLEGHENY COUNTY PENNSYLVANIA
PA-085	MERCER CO	MERCER COUNTY PENNSYLVANIA
*****	*****	*****

COUNTY AGENCIES - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
PA-133	YORK CO	YORK COUNTY PENNSYLVANIA
TN-069	HARDEMAN CO	HARDEMAN COUNTY TENNESSEE
TX-049	BROWN CO	BROWN COUNTY TEXAS
TX-141	EL PASO CO	EL PASO COUNTY TEXAS
UT-035	SALT LAKE CO	SALT LAKE COUNTY UTAH
VA-059	FAIRFAX CO	FAIRFAX COUNTY VIRGINIA
VA-085	HANOVER CO	HANOVER COUNTY VIRGINIA
VA-087	HENRICO CO	HENRICO COUNTY VIRGINIA
WA-033	KING CO	KING COUNTY WASHINGTON
WA-049	PACIFIC CO	PACIFIC CO WASHINGTON
WI-027	DODGE CO	DODGE COUNTY WISCONSIN
WI-101	RACINE CO	RACINE COUNTY WISCONSIN
WV-069	OHIO CO	OHIO COUNTY WEST VIRGINIA
WV-085	RITCHIE CO	RITCHIE COUNTY WEST VIRGINIA

CITY AGENCIES

SYMBOL	STANDARD ABBREV NAME	FULL NAME
AL2130	C OF MONTGOMERY	CITY OF MONTGOMERY ALABAMA
AR3880	C OF TUPELO	CITY OF TUPELO ARKANSAS
AR4063	C OF WELDON	CITY OF WELDON ARKANSAS
CA0010	C OF ALAMEDA	CITY OF ALAMEDA CALIFORNIA
CA0340	C OF BERKELEY	CITY OF BERKELEY CALIFORNIA
CA0470	C OF BUENA PARK	CITY OF BUENA PARK CALIFORNIA
CA0480	C OF BURBANK	CITY OF BURBANK CALIFORNIA
CA0537	C OF CAMPBELL	CITY OF CAMPBELL CALIFORNIA
CA0710	C OF CHULA VISTA	CITY OF CHULA VISTA CALIFORNIA
CA0790	C OF COLTON	CITY OF COLTON CALIFORNIA
CA1182	C OF ENCINITAS	CITY OF ENCINITAS CALIFORNIA
CA1220	C OF EUREKA	CITY OF EUREKA CALIFORNIA
CA1364	C OF FREMONT	CITY OF FREMONT CALIFORNIA
CA1370	C OF FRESNO	CITY OF FRESNO CALIFORNIA
CA1430	C OF GLENDALE	CITY OF GLENDALE CALIFORNIA
CA1520	C OF GUSTINE	CITY OF GUSTINE CALIFORNIA
CA1540	C OF HANFORD	CITY OF HANFORD CALIFORNIA
CA1580	C OF HEMET	CITY OF HEMET CALIFORNIA
CA1560	C OF HAYWARD	CITY OF HAYWARD CALIFORNIA
CA1970	C OF LONG BEACH	CITY OF LONG BEACH CALIFORNIA
CA1980	C OF LOS ANGELES	CITY OF LOS ANGELES CALIFORNIA
CA2090	C OF MARTINEZ	CITY OF MARTINEZ CALIFORNIA
CA2290	C OF MORRO BAY	CITY OF MORRO BAY CALIFORNIA
CA2390	C OF NEWMAN	CITY OF NEWMAN CALIFORNIA
CA2480	C OF OAKLAND	CITY OF OAKLAND CALIFORNIA
CA2550	C OF ONTARIO	CITY OF ONTARIO CALIFORNIA
CA2650	C OF PALM SPRINGS	CITY OF PALM SPRINGS CALIFORNIA
CA2700	C OF PASADENA	CITY OF PASADENA CALIFORNIA
CA2780	C OF PISMO BEACH	CITY OF PISMO BEACH CALIFORNIA
CA2840	C OF PLEASANTON	CITY OF PLEASANTON CALIFORNIA
CA2880	C OF PORTERVILLE	CITY OF PORTERVILLE CALIFORNIA
CA2940	C OF RED BLUFF	CITY OF RED BLUFF CALIFORNIA

CITY AGENCIES - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
CA2970	C OF REDONDO BEACH	CITY OF REDONDO BEACH CALIFORNIA
CA2980	C OF REDWOOD CITY	CITY OF REDWOOD CITY CALIFORNIA
CA3210	C OF SAN BERNARDINO	CITY OF SAN BERNARDINO CALIFORNIA
CA3260	C OF SAN DIEGO	CITY OF SAN DIEGO CALIFORNIA
CA3280	C OF SAN FERNANDO	CITY OF SAN FERNANDO CALIFORNIA
CA3290	C OF SAN FRANCISCO	CITY OF SAN FRANCISCO CALIFORNIA
CA3340	C OF SAN JOSE	CITY OF SAN JOSE CALIFORNIA
CA3370	C OF SAN LUIS OBISPO	CITY OF SAN LUIS OBISPO CALIFORNIA
CA3380	C OF SAN MARINO	CITY OF SAN MARINO CALIFORNIA
CA3390	C OF SAN MATEO	CITY OF SAN MATEO CALIFORNIA
CA3410	C OF SAN RAFAEL	CITY OF SAN RAFAEL CALIFORNIA
CA3420	C OF SANTA ANA	CITY OF SANTA ANA CALIFORNIA
CA3460	C OF SANTA MARIA	CITY OF SANTA MARIA CALIFORNIA
CA3480	C OF SANTA PAULA	CITY OF SANTA PAULA CALIFORNIA
CA3490	C OF SANTA ROSA	CITY OF SANTA ROSA CALIFORNIA
CA3590	C OF SELMA	CITY OF SELMA CALIFORNIA
CA3660	C OF SONOMA	CITY OF SONOMA CALIFORNIA
CA3800	C OF SUSANVILLE	CITY OF SUSANVILLE CALIFORNIA
CA3920	C OF TULARE	CITY OF TULARE CALIFORNIA
CA4020	C OF VALLEJO	CITY OF VALLEJO CALIFORNIA
CA4027	C OF VENTURA	CITY OF VENTURA CALIFORNIA
CA4070	C OF WALNUT CREEK	CITY OF WALNUT CREEK CALIFORNIA
CA4100	C OF WATSONVILLE	CITY OF WATSONVILLE CALIFORNIA
CO2150	C OF ROCKY FORD	CITY OF ROCKY FORD COLORADO
CT0080	C OF BRIDGEPORT	CITY OF BRIDGEPORT CONNECTICUT
CT0280	C OF HARTFORD	CITY OF HARTFORD CONNECTICUT
CT0360	C OF MADISON	CITY OF MADISON CONNECTICUT
CT0370	C OF MERIDEN	CITY OF MERIDEN CONNECTICUT
CT0380	C OF MIDDLETOWN	CITY OF MIDDLETOWN CONNECTICUT
CT0430	C OF NEW HAVEN	CITY OF NEW HAVEN CONNECTICUT
CT0810	C OF WATERBURY	CITY OF WATERBURY CONNECTICUT
FL0290	C OF BOCA RATON	CITY OF BOCA RATON FLORIDA
FL0570	C OF CLEARWATER	CITY OF CLEARWATER FLORIDA
FL0780	C OF DAYTONA BEACH	CITY OF DAYTONA BEACH FLORIDA
FL1420	C OF HOLLYWOOD	CITY OF HOLLYWOOD FLORIDA
FL1510	C OF JACKSONVILLE	CITY OF JACKSONVILLE FLORIDA
FL2010	C OF MIAMI	CITY OF MIAMI FLORIDA
FL2730	C OF ST PETERSBURG	CITY OF ST PETERSBURG FLORIDA
FL2940	C OF TALLAHASSEE	CITY OF TALLAHASSEE FLORIDA
GA0760	C OF BRUNSWICK	CITY OF BRUNSWICK GEORGIA
GA3440	C OF MARIETTA	CITY OF MARIETTA GEORGIA
HI2400	C OF HONOLULU	CITY OF HONOLULU HAWAII
IA2520	C OF DYSART	CITY OF DYSART IOWA
IA2530	C OF EAGLE GROVE	CITY OF EAGLE GROVE IOWA
IA5240	C OF MAQUOKETA	CITY OF MAQUOKETA IOWA
IA7490	C OF SAC CITY	CITY OF SAC CITY IOWA
IA8880	C OF WEBSTER CITY	CITY OF WEBSTER CITY IOWA
IL0840	C OF BLOOMINGTON	CITY OF BLOOMINGTON ILLINOIS
IL1670	C OF CHICAGO	CITY OF CHICAGO ILLINOIS
IL2380	C OF DIXON	CITY OF DIXON ILLINOIS
IL3200	C OF FREEBURG	CITY OF FREEBURG ILLINOIS
IL3910	C OF HIGHLAND PARK	CITY OF HIGHLAND PARK ILLINOIS
IL4710	C OF LAWRENCEVILLE	CITY OF LAWRENCEVILLE ILLINOIS
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CITY AGENCIES - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
IL4910	C OF LOCKPORT	CITY OF LOCKPORT ILLINOIS
IL5360	C OF MASON CITY	CITY OF MASON CITY ILLINOIS
IL6850	C OF PEORIA	CITY OF PEORIA ILLINOIS
IL7640	C OF ST CHARLES	CITY OF ST CHARLES ILLINOIS
IL9210	C OF WESTERN SPRINGS	CITY OF WESTERN SPRINGS ILLINOIS
IN1830	C OF GOSHEN	CITY OF GOSHEN INDIANA
IN3480	C OF NEW HAVEN	CITY OF NEW HAVEN INDIANA
KS5400	C OF TOPEKA	CITY OF TOPEKA KANSAS
KY2090	C OF LOUISVILLE	CITY OF LOUISVILLE KENTUCKY
LA0040	C OF ALEXANDRIA	CITY OF ALEXANDRIA LOUISIANA
LA1150	C OF JONESBORO	CITY OF JONESBORO LOUISIANA
LA1690	C OF NEW ORLEANS	CITY OF NEW ORLEANS LOUISIANA
LA2410	C OF WEST MONROE	CITY OF WEST MONROE LOUISIANA
MA0035	C OF ANDOVER	CITY OF ANDOVER MASSACHUSETTS
MA0120	C OF BOSTON	CITY OF BOSTON MASSACHUSETTS
MA0170	C OF CAMBRIDGE	CITY OF CAMBRIDGE MASSACHUSETTS
MA0660	C OF MALDEN	CITY OF MALDEN MASSACHUSETTS
MD0050	C OF BALTIMORE	CITY OF BALTIMORE MARYLAND
MD0580	C OF FREDERICK	CITY OF FREDERICK MARYLAND
MD0730	C OF HAGERSTOWN	CITY OF HAGERSTOWN MARYLAND
ME0250	C OF BANGOR	CITY OF BANGOR MAINE
ME6400	C OF PORTLAND	CITY OF PORTLAND MAINE
MI0490	C OF BIRMINGHAM	CITY OF BIRMINGHAM MICHIGAN
MI0700	C OF CADILLAC	CITY OF CADILLAC MICHIGAN
MI0890	C OF CHARLOTTE	CITY OF CHARLOTTE MICHIGAN
MI1150	C OF CROSWELL	CITY OF CROSWELL MICHIGAN
MI1260	C OF DETROIT	CITY OF DETROIT MICHIGAN
MI1730	C OF FLINT	CITY OF FLINT MICHIGAN
MI1800	C OF FRANKFORT	CITY OF FRANKFORT MICHIGAN
MI2010	C OF GRAND RAPIDS	CITY OF GRAND RAPIDS MICHIGAN
MI2520	C OF KALAMAZOO	CITY OF KALAMAZOO MICHIGAN
MI2990	C OF MANTON	CITY OF MANTON MICHIGAN
MI3320	C OF MONROE	CITY OF MONROE MICHIGAN
MI3740	C OF OTSEGO	CITY OF OTSEGO MICHIGAN
MI4020	C OF PONTIAC	CITY OF PONTIAC MICHIGAN
MI4760	C OF STURGIS	CITY OF STURGIS MICHIGAN
MI5310	C OF WYANDOTTE	CITY OF WYANDOTTE MICHIGAN
MN4760	C OF MINNEAPOLIS	CITY OF MINNEAPOLIS MINNESOTA
MO7070	C OF ST JOSEPH	CITY OF ST JOSEPH MISSOURI
MO7080	C OF ST LOUIS	CITY OF ST LOUIS MISSOURI
NC1460	C OF ELIZABETH CITY	CITY OF ELIZABETH CITY NORTH CAROLINA
NC1940	C OF GREENSBORO	CITY OF GREENSBORO NORTH CAROLINA
NC4070	C OF SALISBURY	CITY OF SALISBURY NORTH CAROLINA
NH0020	C OF BERLIN	CITY OF BERLIN NEW HAMPSHIRE
NJ1775	C OF LYNDHURST	CITY OF LYNDHURST NEW JERSEY
NJ2130	C OF NEWARK	CITY OF NEWARK NEW JERSEY
NJ2510	C OF PATERSON	CITY OF PATERSON NEW JERSEY
NJ2570	C OF PERTH AMBOY	CITY OF PERTH AMBOY NEW JERSEY
NJ3705	C OF WOODBRIDGE	CITY OF WOODBRIDGE NEW JERSEY
NM0030	C OF ALBUQUERQUE	CITY OF ALBUQUERQUE NEW MEXICO
NV0139	C OF MOUNTAIN CITY	CITY OF MOUNTAIN CITY NEVADA
NV0170	C OF RENO	CITY OF RENO NEVADA
NY0750	C OF BUFFALO	CITY OF BUFFALO NEW YORK
*****	*****	*****

CITY AGENCIES - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
NY3070	C OF LACKAWANNA	CITY OF LACKAWANNA NEW YORK
NY3340	C OF LOCKPORT	CITY OF LOCKPORT NEW YORK
NY3940	C OF MOUNT VERNON	CITY OF MOUNT VERNON NEW YORK
NY4120	C OF NEW ROCHELLE	CITY OF NEW ROCHELLE NEW YORK
NY4170	C OF NEW YORK	CITY OF NEW YORK NEW YORK
NY4210	C OF NIAGARA FALLS	CITY OF NIAGARA FALLS NEW YORK
NY5230	C OF ROCHESTER	CITY OF ROCHESTER NEW YORK
NY6450	C OF WATERTOWN	CITY OF WATERTOWN NEW YORK
NY6820	C OF YONKERS	CITY OF YONKERS NEW YORK
OH0070	C OF AKRON	CITY OF AKRON OHIO
OH1320	C OF CANTON	CITY OF CANTON OHIO
OH1610	C OF CINCINNATI	CITY OF CINCINNATI OHIO
OH1680	C OF CLEVELAND	CITY OF CLEVELAND OHIO
OH1800	C OF COLUMBUS	CITY OF COLUMBUS OHIO
OH2090	C OF DAYTON	CITY OF DAYTON OHIO
OH3895	C OF KETTERING	CITY OF KETTERING OHIO
OH4820	C OF MASSILLON	CITY OF MASSILLON OHIO
OH8070	C OF TIFFIN	CITY OF TIFFIN OHIO
OH8120	C OF TOLEDO	CITY OF TOLEDO OHIO
OR1310	C OF MEDFORD	CITY OF MEDFORD OREGON
OR1650	C OF PORTLAND	CITY OF PORTLAND OREGON
OR1810	C OF SALEM	CITY OF SALEM OREGON
PA0110	C OF ALLENTOWN	CITY OF ALLENTOWN PENNSYLVANIA
PA1230	C OF CHAMBERSBURG	CITY OF CHAMBERSBURG PENNSYLVANIA
PA1296	C OF CHESTER TOWNSHP	CITY OF CHESTER TOWNSHIP PENNSYLVANIA
PA2270	C OF EASTON	CITY OF EASTON PENNSYLVANIA
PA4010	C OF JOHNSTOWN	CITY OF JOHNSTOWN PENNSYLVANIA
PA6600	C OF PITTSBURGH	CITY OF PITTSBURGH PENNSYLVANIA
PA8880	C OF WASHINGTON	CITY OF WASHINGTON PENNSYLVANIA
PA8920	C OF WAYNESBORO	CITY OF WAYNESBORO PENNSYLVANIA
TX1730	C OF DALLAS	CITY OF DALLAS TEXAS
TX2450	C OF FORT WORTH	CITY OF FORT WORTH TEXAS
TX3280	C OF HOUSTON	CITY OF HOUSTON TEXAS
TX6090	C OF SAN ANTONIO	CITY OF SAN ANTONIO TEXAS
VA1720	C OF NEWPORT NEWS	CITY OF NEWPORT NEWS VIRGINIA
VA1760	C OF NORFOLK	CITY OF NORFOLK VIRGINIA
VA2060	C OF RICHMOND	CITY OF RICHMOND VIRGINIA
VA2540	C OF VIRGINIA BEACH	CITY OF VIRGINIA BEACH VIRGINIA
WA1960	C OF SEATTLE	CITY OF SEATTLE WASHINGTON
WI1760	C OF FORT ATKINSON	CITY OF FORT ATKINSON WISCONSIN
WI2320	C OF JANESVILLE	CITY OF JANESVILLE WISCONSIN
WI3100	C OF MILWAUKEE	CITY OF MILWAUKEE WISCONSIN
WI3810	C OF PLYMOUTH	CITY OF PLYMOUTH WISCONSIN
WI4060	C OF RHINELANDER	CITY OF RHINELANDER WISCONSIN
WI4330	C OF SHEBOYGAN	CITY OF SHEBOYGAN WISCONSIN
WV0260	C OF BLUEFIELD	CITY OF BLUEFIELD WEST VIRGINIA
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PUBLIC INTER-CITY AND REGIONAL AGENCIES

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
ACWD	ALAMEDA CO WTR DISTR	ALAMEDA COUNTY WATER DISTRICT
AEWD	ARVIN-EDISON W DISTR	ARVIN-EDISON WATER DISTRICT
CID	CENTER IRRIG DISTR	CENTERVILLE IRRIGATION DISTRICT
CRGS	CLEVE REG GEOD SURV	CLEVELAND REGIONAL GEODETIC SURVEY
DMWW	DENVER MUN WATER WKS	DENVER MUNICIPAL WATER WORKS
EBDA	EAST BAY DISCH AUTH	EAST BAY SEWAGE DISCHARGE AUTHORITY
EBMUD	E BAY MUN UTIL DISTR	EAST BAY MUNICIPAL UTILITIES DISTRICT
HCFC	HARRIS CO FLOOD DIST	HARRIS COUNTY TEXAS FLOOD CONTROL DISTRICT
HHWS	HETCH HETCHY WTR SUP	HETCH HETCHY WATER SUPPLY DISTRICT
IID	IMPERIAL IRRIG DISTR	IMPERIAL IRRIGATION DISTRICT
LACFCD	LA FLOOD CONTROL DIST	LOS ANGELES FLOOD CONTROL DISTRICT
LAHRBR	LA HARBOR DEPARTMENT	LOS ANGELES HARBOR DEPARTMENT
LAWPC	LA WTR AND PWR COMM	LOS ANGELES WATER AND POWER COMMISSION
MARTA	METRO ATLANTA RTA	METROPOLITAN ATLANTA RAPID TRANSIT AUTHORITY
MID	MODESTO IRRIG DISTR	MODESTO IRRIGATION DISTRICT
MRGCD	MDL RIO GRANDE DIST	MIDDLE RIO GRANDE CONSERVATION DISTRICT
MRMSC	MILWAUKEE-RACINE MSC	MILWAUKEE-RACINE METROPOLITAN SEWAGE COMM
MWDSC	METRO WTR DISTR S CA	METROPOLITAN WATER DISTRICT OF SO CALIFORNIA
NOS+WB	NEW ORLEANS SEWERAGE	NEW ORLEANS SEWERAGE AND WATER BOARD
NYPA	NY PORT AUTHORITY	NEW YORK PORT AUTHORITY
OID	OAKDALE IRRIG DISTR	OAKDALE IRRIGATION DISTRICT
OROW	OHIO RIVER ORD WORKS	OHIO RIVER ORDINANCE WORKS
RIRD	RYER IS RECLAM DISTR	RYER ISLAND RECLAMATION DISTRICT
SDWD	SAN DIEGO WTR DISTR	SAN DIEGO WATER DISTRICT
SEWRPC	SE WI REG PLAN COMM	SE WISCONSIN REGIONAL PLANNING COMMISSION
SFLWMD	S FL WATER MGMT DIST	SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWD	S FRANCISCO WTR DEPT	SAN FRANCISCO WATER DEPARTMENT
SJID	SAN JOAQUIN IRR DIST	SAN JOAQUIN IRRIGATION DISTRICT
SVIP	SACRAMENTO IRRIG	SACRAMENTO VALLEY IRRIGATION PROJECT
SWFWM	SW FL WTR MGMT DIST	SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
TID	TURLOCK IRRIG DISTR	TURLOCK IRRIGATION DISTRICT
TLAKE	TULARE LAKE IRRIG	TULARE LAKE IRRIGATION DISTRICT
WMATA	WASH METRO TRANSIT	WASHINGTON METROPOLITAN AREA TRANSIT AUTH
WSSC	WASH SUBURB SAN COMM	WASHINGTON SUBURBAN SANITARY COMMISSION
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RAILROADS

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
ACYRR	AKRON RAILROAD	AKRON CANTON AND YOUNGSTOWN RAILROAD
AGSRR	ALABAMA GREAT SO RR	ALABAMA GREAT SOUTHERN RAILROAD
ATNRR	ALABAMA NORTHERN RR	ALABAMA TENNESSEE AND NORTHERN RAILROAD
ATSFRR	SANTA FE RAILROAD	ATCHISON TOPEKA AND SANTA FE RAILROAD
BARR	BANGOR AND AROOSTOOK	BANGOR AND AROOSTOOK RAILROAD
BLERR	BESSEMER RAILROAD	BESSEMER AND LAKE ERIE RAILROAD
BMRR	BOSTON AND MAINE RR	BOSTON AND MAINE RAILROAD
BNRR	BURLINGTON NORTHERN	BURLINGTON NORTHERN RAILROAD
BORR	BALTIMORE AND OHIO	BALTIMORE AND OHIO RAILROAD
CBQRR	BURLINGTON RAILROAD	CHICAGO BURLINGTON AND QUINCY RAILROAD
CHWRR	CHESAPEAKE AND WEST	CHESAPEAKE AND WESTERN RAILROAD
CIMRR	ILLINOIS MIDLAND RR	CHICAGO AND ILLINOIS MIDLAND RAILROAD
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RAILROADS - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
CLGRR	COLUMBUS-GREENVILLE	COLUMBUS AND GREENVILLE RAILROAD
CMPPRR	MILWAUKEE AND PACIF	CHICAGO MILWAUKEE ST PAUL AND PACIFIC RR
CNJRR	CENTRAL OF NJ RR	CENTRAL OF NEW JERSEY RAILROAD
CNWRR	CHICAGO AND NW RR	CHICAGO AND NORTH WESTERN RAILROAD
CORR	CHESAPEAKE AND OHIO	CHESAPEAKE AND OHIO RAILROAD
CPRR	CANADIAN PACIFIC RR	CANADIAN PACIFIC RAILROAD
CRNRR	CAROLINA AND NW RR	CAROLINA AND NORTHWESTERN RAILROAD
CVRR	CENTRAL VERMONT RR	CENTRAL VERMONT RAILROAD
DHRR	DELAWARE AND HUDSON	DELAWARE AND HUDSON RAILROAD
DLWRR	DELAWARE RAILROAD	DELAWARE LACKAWANNA AND WESTERN RAILROAD
DMIRRR	IRON RANGE RAILROAD	DULUTH MISSABE AND IRON RANGE RAILROAD
DMRR	DETROIT AND MACKINAW	DETROIT AND MACKINAW RAILROAD
DRGWRR	RIO GRANDE RAILROAD	DENVER AND RIO GRANDE WESTERN RAILROAD
DTSRR	TOLEDO SHORE LINE RR	DETROIT AND TOLEDO SHORE LINE RAILROAD
DWPRR	DULUTH AND PACIFIC	DULUTH-WINNIPEG AND PACIFIC RAILROAD
ELRR	LACKAWANNA RAILROAD	ERIE LACKAWANNA RAILROAD
ERIERR	ERIE RAILROAD	ERIE RAILROAD
FECRR	FL EAST COAST RR	FLORIDA EAST COAST RAILROAD
GCSFRC	GULF CO + SANTA FE	GULF COLORADO AND SANTA FE RAILWAY COMPANY
GMORR	GULF RAILROAD	GULF MOBILE AND OHIO RAILROAD
GNRR	GREAT NORTHERN RR	GREAT NORTHERN RAILROAD
GTWRR	GRAND TRUNK WESTERN	GRAND TRUNK WESTERN RAILROAD
GWRR	GREAT WESTERN RR	GREAT WESTERN RAILROAD
ICRR	ILLINOIS CENTRAL RR	ILLINOIS CENTRAL RAILROAD
INTRR	INTERSTATE RAILROAD	INTERSTATE RAILROAD
KCSRR	KC SOUTHERN RAILROAD	KANSAS CITY SOUTHERN RAILROAD
LARR	LOUISIANA-ARKANSAS	LOUISIANA AND ARKANSAS RAILROAD
LIRR	LONG ISLAND RAILROAD	LONG ISLAND RAILROAD
LNRR	LOUIS AND NASH RR	LOUISVILLE AND NASHVILLE RAILROAD
LVRR	LEHIGH VALLEY RR	LEHIGH VALLEY RAILROAD
MCRR	MICHIGAN CENTRAL RR	MICHIGAN CENTRAL RAILROAD
MKTRR	MKT RAILROAD	MISSOURI KANSAS TEXAS RAILROAD
MPRR	MISSOURI PACIFIC RR	MISSOURI PACIFIC RAILROAD
NCRR	NASHVILLE RAILROAD	NASHVILLE CHATTANOOGA AND ST LOUIS RAILROAD
NPRR	NORTHERN PACIFIC RR	NORTHERN PACIFIC RAILROAD
NSRR	NORFOLK SOUTHERN RR	NORFOLK SOUTHERN RAILROAD
NWPRR	NW PACIFIC RAILROAD	NORTHWESTERN PACIFIC RAILROAD
NWRR	NORFOLK AND WESTERN	NORFOLK AND WESTERN RAILROAD
NYCRR	NEW YORK CENTRAL RR	NEW YORK CENTRAL RAILROAD
NYSLRR	NEW YORK ST LOUIS RR	NEW YORK CHICAGO AND ST LOUIS RAILROAD
NYSWRR	SUSQUEHANNA RAILROAD	NEW YORK SUSQUEHANNA AND WESTERN RAILROAD
PCRR	PENN CENTRAL RR	PENN CENTRAL RAILROAD
PLERR	PITTSBURGH RAILROAD	PITTSBURGH AND LAKE ERIE RAILROAD
PMRR	PERE MARQUETTE RR	PERE MARQUETTE RAILROAD
PRR	PENNSYLVANIA RR	PENNSYLVANIA RAILROAD
RDGRR	READING RAILROAD	READING RAILROAD
RIRR	ROCK ISLAND RAILROAD	CHICAGO ROCK ISLAND AND PACIFIC RAILROAD
SCLRR	SEABOARD RAILROAD	SEABOARD COAST LINE RAILROAD
SLSFRR	ST LOUIS SAN FRAN RR	ST LOUIS SAN FRANCISCO RAILROAD
SLSWRR	ST LOUIS SW RAILROAD	ST LOUIS SOUTHWESTERN RAILROAD
SNRR	SACRAMENTO NORTHERN	SACRAMENTO NORTHERN RAILROAD
SOORR	SOO LINE RAILROAD	SOO LINE RAILROAD
SOURR	SOUTHERN RAILROAD	SOUTHERN RAILROAD
*****	*****	*****

RAILROADS - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
SPRR	SOUTHERN PACIFIC RR	SOUTHERN PACIFIC RAILROAD
TMRR	TEXAS MEXICAN RR	TEXAS MEXICAN RAILROAD
TPWRR	TOLEDO AND WESTERN	TOLEDO PEORIA AND WESTERN RAILROAD
UPRR	UNION PACIFIC RR	UNION PACIFIC RAILROAD
VTRR	VERMONT RAILROAD	VERMONT RAILROAD
WARR	WESTERN OF ALABAMA	WESTERN OF ALABAMA RAILROAD
WLERR	WHEELING RAILROAD	WHEELING AND LAKE ERIE RAILROAD
WMRR	WESTERN MARYLAND RR	WESTERN MARYLAND RAILROAD
WPRR	WESTERN PACIFIC RR	WESTERN PACIFIC RAILROAD
YVRR	YOSEMITE VALLEY RR	YOSEMITE VALLEY RAILROAD
*****	*****	*****

PETROLEUM AND PIPELINE COMPANIES

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
AMOCO	AMOCO	AMOCO OIL COMPANY
AOCO	ASSOCIATED OIL CO	ASSOCIATED OIL COMPANY
ARFUEL	AR FUEL OIL COMPANY	AR FUEL OIL COMPANY
ATRECO	ATLANTIC REFINING CO	ATLANTIC REFINING COMPANY
BOCO	BELRIDGE OIL COMPANY	BELRIDGE OIL COMPANY
CHOCO	CHEVRON OIL COMPANY	CHEVRON OIL COMPANY
CITGO	CITIES SERVICE CO	CITIES SERVICE COMPANY
CONOCO	CONTINENTAL OIL CO	CONTINENTAL OIL COMPANY
CREOLE	CREOLE PETROLEUM CO	CREOLE PETROLEUM COMPANY
GPCC	GENERAL PETROLEUM	GENERAL PETROLEUM CORPORATION OF CALIFORNIA
GULF	GULF REFINING CO	GULF REFINING COMPANY
HOCO	HONOLULU OIL COMPANY	HONOLULU OIL COMPANY
HUMBLE	HUMBLE OIL COMPANY	HUMBLE OIL AND REFINING COMPANY
LPCO	LAKEHEAD PIPELINE CO	LAKEHEAD PIPELINE COMPANY
MWPLC	MI-WI PIPELINE CO	MICHIGAN-WISCONSIN PIPELINE COMPANY
NGPCA	NATURAL GAS CO	NATURAL GAS PIPELINE COMPANY OF AMERICA
OHOCO	OHIO OIL COMPANY	OHIO OIL COMPANY
PHILIP	PHILLIPS PETROLEUM	PHILLIPS PETROLEUM COMPANY
ROCO	RICHFIELD OIL CO	RICHFIELD OIL COMPANY
SHELL	SHELL OIL COMPANY	SHELL OIL COMPANY
SOCO	STANDARD OIL COMPANY	STANDARD OIL COMPANY
SOGCO	SIGNAL OIL AND GAS	SIGNAL OIL AND GAS COMPANY
SUNOCO	SUN OIL COMPANY	SUN OIL COMPANY
SUPOCO	SUPERIOR OIL COMPANY	SUPERIOR OIL COMPANY
TENNEC	TENNECO	TENNESSEE GAS AND PIPELINE COMPANY
TWOCO	TIDEWATER OIL CO	TIDEWATER OIL COMPANY
UOCO	UNION OIL COMPANY	UNION OIL COMPANY
VOCO	VALVOLINE OIL CO	VALVOLINE OIL COMPANY
*****	*****	*****

GAS AND ELECTRIC UTILITY COMPANIES

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
AGASEL	ASSOCIATED G AND E	ASSOCIATED GAS AND ELECTRIC COMPANY
ALPCO	ALABAMA POWER CO	ALABAMA POWER COMPANY
APC	APPALACHIAN POWER CO	APPALACHIAN POWER COMPANY
ARLAGC	AR-LA GAS COMPANY	AR-LA GAS COMPANY
CONED	CONSOLIDATED EDISON	CONSOLIDATED EDISON POWER COMPANY
CONSPC	CONSUMER POWER CO	CONSUMER POWER COMPANY OF MICHIGAN
CTP&L	CT POWER AND LIGHT	CONNECTICUT POWER AND LIGHT COMPANY
DECO	DETROIT EDISON CO	DETROIT EDISON COMPANY
FLPCO	FLORIDA POWER CO	FLORIDA POWER COMPANY
HLPCO	HOUSTON L AND P CO	HOUSTON LIGHTING AND POWER COMPANY
IMECO	IN-MI ELECTRIC CO	INDIANA-MICHIGAN ELECTRIC COMPANY
LONESR	LONE STAR GAS CO	LONE STAR GAS COMPANY
MINPCO	MI NORTHERN POWER CO	MICHIGAN NORTHERN POWER COMPANY
MSP+L	MS POWER AND LIGHT	MISSISSIPPI POWER AND LIGHT COMPANY
NJP+L	NJ POWER AND LIGHT	NEW JERSEY POWER AND LIGHT COMPANY
OHPCO	OHIO POWER COMPANY	OHIO POWER COMPANY
PEPCO	POTOMAC EDISON POWER	POTOMAC EDISON POWER COMPANY
PG+E	PACIFIC G AND E CO	PACIFIC GAS AND ELECTRIC COMPANY
PHELCO	PHILA ELECTRIC CO	PHILADELPHIA ELECTRIC COMPANY
PWPCO	PA WTR AND POWER CO	PENNSYLVANIA WATER AND POWER COMPANY
SCECO	SO CALIFORNIA EDISON	SOUTHERN CALIFORNIA EDISON COMPANY
SCE+G	SC ELECTRIC AND GAS	SOUTH CAROLINA ELECTRIC AND GAS COMPANY
SDG+E	SAN DIEGO G AND E CO	SAN DIEGO GAS AND ELECTRIC COMPANY
*****	*****	*****

SURVEYING AND CONSTRUCTION INDUSTRY

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
AAS	ATLANTIC AERIAL SURV	ATLANTIC AERIAL SURVEYS
ABRAMS	ABRAMS AERIAL SURV	ABRAMS AERIAL SURVEYS
ACFPS	ACF SURVEYS	ACF PRECISION SURVEYS INCORPORATED
AEROS	AERO SERVICE CORP	AERO SERVICE CORPORATION
AHI	ATWELL HICKS INC	ATWELL HICKS INC
AIRSUR	AIR SURVEY CORP	AIR SURVEY CORPORATION
AISS	A I SILANDER AND SON	A I SILANDER AND SON
ALSTER	ALSTER ASSOCIATES	ALSTER AND ASSOCIATES ENGINEERS
BAKER	M BAKER JR INC	M BAKER JR INC
BGAS	BRUCE + GUNN SURVEYS	BRUCE AND GUNN AERIAL SURVEYS
BMMS	BOUTELLE MACFARLANE	BOUTELLE MACFARLANE MEYER AND SELEE
BRADY	BRADY LAND SURVEYING	BRADY LAND SURVEYING INC
BRWE	BROCK AND WEYMOUTH	BROCK AND WEYMOUTH ENGINEERS
BWDCO	BERKELEY WTRF DEV CO	BERKELEY WATERFRONT DEVELOPMENT COMPANY
CEJA	C E JOHNSON ASSOC	C E JOHNSON AND ASSOCIATES INC
CFM	C F MERRIAM SURVEYOR	C F MERRIAM SURVEYOR
CHAMBA	CHAMBLIN ASSOCIATES	CHAMBLIN AND ASSOCIATES
CHIPPR	CHIPPERFIELD NAVIG	N R CHIPPERFIELD NAVIGATION SERVICES
CL	CLIFFORD LEISURE CE	CLIFFORD LEISURE CIVIL ENGINEER
COLGOV	COLBURN AND GOVE	COLBURN AND GOVE CONSULTING ENGINEERS
CTMALE	C T MALE ASSOCIATES	C T MALE ASSOCIATES
DARA	D A RATEKIN ASSOC	D A RATEKIN AND ASSOCIATES
DEC	DAHLING ENGINEER CO	DAHLING ENGINEERING COMPANY
*****	*****	*****

SURVEYING AND CONSTRUCTION INDUSTRY - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
DECKER	R L DECKER	R L DECKER
DELTA	DELTA ENGINEERS INC	DELTA ENGINEERS INC
DUNLAP	DUNLAP ASSOCIATES	DUNLAP ASSOCIATES
EESCC	E E STULLER CONST CO	E E STULLER CONSTRUCTION COMPANY
EWB	E W BRAASCH CONS ENG	E W BRAASCH CONSULTING ENGINEER
FAMC	FALCON AIR MAPS CO	FALCON AIR MAPS COMPANY
FAS	FAIRCHILD AER SURV	FAIRCHILD AERIAL SURVEYS
GHA	G HENKENHOFF ASSC	G HENKENHOFF AND ASSOCIATES
HALSEY	HALSEY CIVIL ENG INC	W H HALSEY CIVIL ENGINEERS INC
HDA	HORTON DENNIS ASSOC	HORTON DENNIS ASSOCIATES
ISBELL	ISBELL CONST COMPANY	ISBELL CONSTRUCTION COMPANY
JBB	J B BLYDENBURGH SURV	J B BLYDENBURGH SURVEYOR
JKPLS	JEFF KERN PLS	JEFF KERN PROFESSIONAL LAND SURVEYOR
KONSKI	KONSKI ENGINEERS	KONSKI ENGINEERS
LAFAVE	LAFAVE LAND SURVEYOR	A LAFAVE LAND SURVEYOR
LDA	L DICKERSON ASSOC	LEWIS DICKERSON AND ASSOCIATES CONS ENG
LEAS	LIMBAUGH ENGINEERING	LIMBAUGH ENGINEERING AND AERIAL SURVEY INC
LEGER	LEGER SURVEYS INC	LEGER SURVEYS INC
LEVITT	ITT LEVITT CORP	ITT LEVITT CORPORATION
LINDSY	F M LINDSEY ASSOC	F M LINDSEY AND ASSOCIATES
MADHOP	MADDOX AND HOPKINS	MADDOX AND HOPKINS SURVEYORS
MAI	MEYER AND ASSOCIATES	MEYER AND ASSOCIATES INCORPORATED
MATOTA	MATOTAN ASSOCIATES	WILLIAM MATOTAN AND ASSOCIATES
MCCENG	MCCLELLAN ENGINEERS	MCCLELLAN ENGINEERS
MCTUER	MCCARTER AND TULLER	MCCARTER AND TULLER INCORPORATED
MGA	MOORE GARDNER ASSC	MOORE GARDNER AND ASSOCIATES
MHAS	MARK HURD AER SURV	MARK HURD AERIAL SURVEYS
MKWS	M K WELCH SURVEYS	M K WELCH SURVEYS
MLI	MILLER AND LUX INC	MILLER AND LUX INC
MME	MYERS-MACOMBER ENG	MYERS-MACOMBER ENGINEERS
MPS	MCNAMEE PORTER AND S	MACNAMEE PORTER AND SEELEY
NAVSER	NAVIGATION SERVICES	NAVIGATION SERVICES INCORPORATED
OMAN	OMAN CONSTRUCTION CO	OMAN CONSTRUCTION COMPANY
PAS	PARK AERIAL SURVEYS	PARK AERIAL SURVEYS INC
PGEG	PETTY GEOPHYSICAL CO	PETTY GEOPHYSICAL ENGINEERING COMPANY
PHELPS	B E PHELPS INC	B E PHELPS INC
PORTER	NORMAN PORTER ASSOC	NORMAN PORTER ASSOCIATES
SBI	SHERWOOD BROS INC	SHERWOOD BROTHERS INC
SCAN	SCANLON ASSOCIATES	SCANLON AND ASSOCIATES
SECO	SOUTHERN ENGINEERING	SOUTHERN ENGINEERING COMPANY
SELLS	SELLS INC CONS ENG	CHAS H SELLS INC CONSULTING ENGINEERS
SPAN	SPAN INTERNATIONAL	SPAN INTERNATIONAL INCORPORATED
SWECO	STONE WEBSTER ENG	STONE WEBSTER ENGINEERING CORPORATION
THOMAS	THOMAS ENG AND SURV	THOMAS ENGINEERING AND SURVEYING COMPANY
TURNER	A E TURNER ARCHITECT	A E TURNER ARCHITECT
TSI	TOBIN SURVEYS	TOBIN SURVEYS INCORPORATED
URS	URS COMPANY	URS COMPANY
VJV	V J VANLINT CONS ENG	V J VANLINT CONSULTING ENGINEER
VOGI	VOGI IVERS AND ASSOC	VOGI IVERS AND ASSOCIATES
WAA	WALKER + ASSOCIATES	WALKER AND ASSOCIATES INCORPORATED
WARD	E J WARD	E J WARD
WAWHI	WALKER + WHITEFORD	WALKER AND WHITEFORD INCORPORATED
WBCC	WARREN BROS CONST CO	WARREN BROTHERS CONSTRUCTION COMPANY
*****	*****	*****

SURVEYING AND CONSTRUCTION INDUSTRY - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
WFTA	W F TURNEY ASSC	W F TURNEY AND ASSOCIATES
WRA	WHIGMAN-REQUARDT	WHIGMAN AND REQUARDT ASSOCIATES
WESGEO	WESTERN GEOPHYSICAL	WESTERN GEOPHYSICAL COMPANY OF AMERICA
WSA	WILLIAMS-STACKHOUSE	WILLIAMS AND STACKHOUSE ASSOCIATES
*****	*****	*****

MISCELLANEOUS COMMERCIAL ORGANIZATIONS AND PRIVATE FIRMS

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
AKGEO	ALASKAN GEOPHYSICAL	ALASKAN GEOPHYSICAL
AKLPCO	AK LUMBER AND PULP	ALASKA LUMBER AND PULP COMPANY
ATCO	ASSOC TRACTION CO	ASSOCIATED TRACTION COMPANY
ATT	AMERICAN T AND T CO	AMERICAN TELEPHONE AND TELEGRAPH COMPANY
BGCO	BROWN GEOPHYSICAL CO	BROWN GEOPHYSICAL COMPANY
BW	BRADFORD WASHBURN	BRADFORD WASHBURN
BWCO	BONO-WILLIAMS CO	BONO-WILLIAMS COMPANY
BULE	BULE AND ASSOCIATES	BULE AND ASSOCIATES
CCCC	CARBIDE AND CARBON	CARBIDE AND CARBON CHEMICALS CORPORATION
CCICO	CLEVE CLIFFS IRON CO	CLEVELAND CLIFFS IRON COMPANY
CH2M	CH2M HILL INC	CH2M HILL INCORPORATED
CLA	CROZER LAND ASSOC	CROZER LAND ASSOCIATION
CPFC	CHAMPION PAPER CO	CHAMPION PAPER AND FIBER COMPANY
CROSET	CROSSETT LUMBER CO	CROSSETT LUMBER COMPANY
DBA	DBA SYSTEMS INC	DBA SYSTEMS INCORPORATED
DOWCO	DOW CHEMICAL COMPANY	DOW CHEMICAL COMPANY
DSI	DESIGN SCIENCES INC	DESIGN SCIENCES INC
DVLCO	D VARDEN LUMBER CO	DOLLY VARDEN LUMBER COMPANY
ENVENG	ENVIRONMENT ENG INC	ENVIRONMENTAL ENGINEERING INC
FMCO	FORD MOTOR COMPANY	FORD MOTOR COMPANY
GCC	GLOGORA COAL COMPANY	GLOGORA COAL COMPANY
GE	GENERAL ELECTRIC	GENERAL ELECTRIC CORPORATION
GEON	GEONAUTICS INC	GEONAUTICS INC
GRDC	GULF RESEARCH CO	GULF RESEARCH AND DEVELOPMENT COMPANY
HAPT	HUGHES AIRPORT	HUGHES AIRPORT
HMCO	HANNA MINING CO	HANNA MINING COMPANY
KETCH	KETCHIKAN PULP CO	KETCHIKAN PULP COMPANY
LAICO	LA INVESTMENT CO	LOS ANGELES INVESTMENT COMPANY
MACCO	MACCO CORPORATION	MACCO CORPORATION
MCAM	MOLYBDENUM CORP	MOLYBDENUM CORPORATION OF AMERICA
MCLCO	MI-CA LUMBER COMPANY	MICHIGAN-CALIFORNIA LUMBER COMPANY
NAAV	NORTH AMERICAN	NORTH AMERICAN AVIATION
NJZINC	NEW JERSEY ZINC CO	NEW JERSEY ZINC COMPANY
PECO	POHLY EXPLORATION CO	POHLY EXPLORATION COMPANY
PACTT	PACIFIC T AND T CO	PACIFIC TELEPHONE AND TELEGRAPH COMPANY
PANAM	PAN AMERICAN	PAN AMERICAN AIRLINES
PCC	PEABODY COAL CO	PEABODY COAL COMPANY
PHILCM	PHILLIPS CHEMICAL CO	PHILLIPS CHEMICAL COMPANY
PPCC	PACIFIC PORT CEMENT	PACIFIC PORTLAND CEMENT CORPORATION
PVE	PALOS VERDES ESTATES	PALOS VERDES ESTATES
REGIS	ST REGIS PAPER CO	ST REGIS PAPER COMPANY
RRLC	RED RIVER LUMBER CO	RED RIVER LUMBER COMPANY
*****	*****	*****

MISCELLANEOUS COMMERCIAL ORGANIZATIONS AND PRIVATE FIRMS - CONTINUED

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
SANDIA	SANDIA CORPORATION	SANDIA CORPORATION
SSC	SEISMOGRAPH SERVICE	SEISMOGRAPH SERVICE CORPORATION
SWBELL	SW BELL TELEPHONE CO	SOUTH WESTERN BELL TELEPHONE COMPANY
TLDYNE	TELEDYNE INC	TELEDYNE INCORPORATED
VAILCO	VAIL COMPANY	VAIL COMPANY
VITRO	VITRO CORPORATION	VITRO CORPORATION
WHITE	WHITE PIGMENT CO	WHITE PIGMENT COMPANY
WE	WESTERN ELECTRIC	WESTERN ELECTRIC COMPANY
*****	*****	*****

ACADEMIC INSTITUTIONS AND AMATEUR ORGANIZATIONS

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
BMS	BOSTON MUSEUM OF SCI	BOSTON MUSEUM OF SCIENCE
BSA	BOY SCOUTS	BOY SCOUTS OF AMERICA
CORUNI	CORNELL UNIVERSITY	CORNELL UNIVERSITY
CU	COLUMBIA UNIVERSITY	COLUMBIA UNIVERSITY
ECM	ENG CLUB OF MEMPHIS	ENGINEERS CLUB OF MEMPHIS
FSNSCH	FARMINGTON STATE	FARMINGTON STATE NORMAL SCHOOL
IASUNI	IOWA STATE UNIV	IOWA STATE UNIVERSITY
JPL	JET PROPULSION LAB	JET PROPULSION LABORATORY
KSU	KANSAS STATE UNIV	KANSAS STATE UNIVERSITY
LAFCOL	LAFAYETTE COLLEGE	LAFAYETTE COLLEGE
LAHSCH	LOS ALTOS HIGH SCH	LOS ALTOS HIGH SCHOOL
LASU	LOUISIANA STATE UNIV	LOUISIANA STATE UNIVERSITY
LEHIGH	LEHIGH UNIVERSITY	LEHIGH UNIVERSITY
MISCOL	MICHIGAN ST COLLEGE	MICHIGAN STATE COLLEGE
MIT	MASS INST OF TECH	MASSACHUSETTS INSTITUTE OF TECHNOLOGY
MITU	MICHIGAN TECH UNIV	MICHIGAN TECHNICAL UNIVERSITY
MSSU	MISSISSIPPI STATE	MISSISSIPPI STATE UNIVERSITY
MUNIV	MARQUETTE UNIVERSITY	MARQUETTE UNIVERSITY
NDSU	NORTH DAKOTA STATE U	NORTH DAKOTA STATE UNIVERSITY
ORTI	OREGON TECH INST	OREGON TECHNICAL INSTITUTE
SUNIV	STANFORD UNIVERSITY	STANFORD UNIVERSITY
TCU	TEXAS CHRISTIAN UNIV	TEXAS CHRISTIAN UNIVERSITY
UC	UNIV OF CALIFORNIA	UNIVERSITY OF CALIFORNIA
UFL	UNIV OF FLORIDA	UNIVERSITY OF FLORIDA
UHI	UNIV OF HAWAII	UNIVERSITY OF HAWAII
UNM	UNIVERSITY OF NM	UNIVERSITY OF NEW MEXICO
UTU	UNIVERSITY OF UTAH	UNIVERSITY OF UTAH
UTX	UNIVERSITY OF TEXAS	UNIVERSITY OF TEXAS
UVA	UNIV OF VIRGINIA	UNIVERSITY OF VIRGINIA
UWI	UNIV OF WISCONSIN	UNIVERSITY OF WISCONSIN
WILCOL	WILLIAMS COLLEGE	WILLIAMS COLLEGE AT WILLIAMSTOWN MA
WVUNIV	WEST VIRGINIA UNIV	WEST VIRGINIA UNIVERSITY
*****	*****	*****

GENERAL NON-SPECIFIC DESIGNATORS

SYMBOL	STANDARD ABBREV NAME	FULL NAME
*****	*****	*****
LOCENG	LOCAL ENGINEER	LOCAL ENGINEER (INDIVIDUAL OR FIRM)
LOCSUR	LOCAL SURVEYOR	LOCAL SURVEYOR (INDIVIDUAL OR FIRM)
UNK	UNKNOWN	UNKNOWN PERSON OR FIRM
*****	*****	*****

INTENTIONALLY BLANK

ANNEX D

GUIDELINES FOR SURVEY POINT NAMES AND DESIGNATIONS

VERTICAL CONTROL POINTS

A vertical control point, commonly referred to as a "bench mark" (BM), is a monumented (or otherwise marked) survey point established for the purpose of providing elevation reference for mapping and charting activities and for a wide variety of engineering and scientific applications.

A vertical control point is normally identified by a number or by an alphanumeric symbol which is usually stamped on the respective disk marker (or otherwise inscribed on the bench mark monument). Less frequently, a bench mark is assigned a concise, intelligible name. In principle, the designation by means of which a vertical control point is identified for publication purposes should closely resemble the designation which actually appears on the respective marker; however, extraneous information is frequently present which is not desired to be included as a part of the designation. For example, the designation of a bench mark should not include the elevation which may also be stamped on the respective disk marker (unless the stamped elevation is the only means of identifying the mark - see below), and it does not generally include the "year mark set" (except for bench marks which have been reset - see below).

In every case, the designation assigned to a bench mark for automatic data processing purposes must be identical to the designation which appears in the heading of the respective bench mark descriptions.

1. A bench mark designation must not exceed 25 alphanumeric characters (including all imbedded blanks). Abbreviate and/or edit an existing designation as necessary to conform to this limit.
2. A designation should include the acronym or abbreviation of the agency or organization whose name is precast in the survey marker (if other than NGS, C&GS, or NOS) - see ANNEX C. When a name is not precast in the survey mark, include the acronym or abbreviation of the agency which set the mark. If the agency cannot be determined, do not include an acronym or abbreviation.

Example:

2903 (USGS)
GAGING STA MORC
RV 16 (RIRR)

Designation:

2903 USGS
GAGING STA MORC
RV 16 RIRR *

3. The only special characters permitted in a bench mark designation are the blank (), plus (+), minus or hyphen (-), equals (=), slash (/), and decimal point (.); when used, these special characters must not be

separated from adjacent characters by any blanks. Commas and parentheses are not allowed to appear in a bench mark designation. The minus or hyphen (-) is allowed only when indicating a negative elevation stamped in a mark. An elevation stamped in a mark is used in the designation only when there is no other means to identify the mark (also see Section 9 below). When a minus or hyphen (-) is used, it must be the first character of the designation. *

Example:

CH 1174, USGS = 297+00 (A)
 ELEV -7.325 FT (USGS)
 H 23 -8.623 FT BOR

Designation:

CH 1174=297+00 A USGS
 -7.325 USGS
 H 23 BOR

4. All alpha and numeric character groupings in a designation must be separated by a blank. Care should be taken that only one blank is used for this purpose; two blanks in a row will be interpreted as end of the designation. *

Example:

TT17B USGS
 TT-17B USGS
 TT-1 7B USGS

Designation:

TT 17 B USGS
 TT 17 B USGS
 TT 1 7 B USGS

5. The characters "NO" or "No." when used as the abbreviation for the word "number" are not to be included in the designation even when stamped in the disk. *

Example:

MONROE NO 1 1944
 (reference mark)
 BENCH MARK No. 6 USGS
 STA NO II 90 TIDAL 23

Designation:

MONROE RM 1
 6 USGS
 872 4580 TIDAL 23

6. A period may not appear imbedded in or adjacent to a grouping of alpha characters; however, a decimal point may appear imbedded in (but not adjacent to) a grouping of numeric characters. *

Example:

ML. 14.2 ICRR
 4419. BOR
 PALMER N.E. BASE

Designation:

MI 14.2 ICRR
 4419 BOR
 PALMER NE BASE

7. For bench marks which carry multiple stamped designation, the designations involved should be concatenated with the equal sign (=) used as separator, subject to the 25-character total length limit. *

Example:

H13 and No 3 1934
STA. NO. 3 and MI. 182.5
(SPRR)
LEE NO 1 1932 (reference
mark) and R 13

Designation:

H 13=872 2621 TIDAL 3
STA 3=MI 182.5 SPRR

LEE RM 1=R 13

*
*
*
*
*

Tidal and water level bench mark designations must conform to standard designations adopted by the National Ocean Survey; see page D-6.

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*

NOTE: Other multiple designations which are not concatenated as indicated in the preceding paragraph (either because they do not appear stamped on the respective disk marker or because they had to be left out in order to meet the 25-character total length limit) must be given as separate data items to be carried as "aliases" in the descriptive data.

*
*

8. Non-specific descriptive terms are not to be treated as "double designations" and hence are not to be carried as aliases.

Example:

BENCH MARK 2 USE
114.3, CHISELED SQUARE (USLS)
C 1, Bolt

Designation:

2 USE
114.3 USLS
C 1

*
*
*

9. The elevation stamped on the disk marker (or otherwise inscribed on the bench mark monument) is not to be carried as a part of the respective bench mark designation, unless the elevation is the only means of identifying the survey mark.

*
*

Example:

H 325 230.695FT
140B (MORC) ELEV 95.3 FT
-9.825 FT (USGS)
ELEV. 101.6 BOR

Designation:

H 325
140 B MORC
-9.825 USGS
101.6 BOR

*
*
*

10. The "year mark set" is to be carried as a part of a bench mark designation only for those bench marks whose designation has not been altered after they were reset. In such a case, the word RESET and the respective year (e.g. RESET 1975) must be appended to the original bench mark designation; however, if the original designation exceeds 14 characters in length, the word RESET is to be omitted and only the "year mark set" appended. In the case of a bench mark which has been reset more than once, only the most recent "year mark set" is to be indicated. Note: When determining the designation of horizontal control marks which have been reset, different guidelines are used. For this case, the word "RESET" is to be appended only when it is actually stamped in the marker. When this occurs, follow the guideline for reset bench marks.

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*

<u>Example:</u>	<u>Designation:</u>	
203 FLGS, reset in 1950 and 1967	203 FLGS RESET 1967	*
TT 8 USGS, reset in 1965	TT 8 USGS RESET 1965	*
LAKE WASHINGTON, horizontal control station reset in 1970	LAKE WASHINGTON 1970	*

11. Occasionally, a horizontal control point is included as a bench mark in a vertical control network. In such a case, the published name of the horizontal control point in question (i.e., the name which appears in the heading of the respective station description and/or subsequent recovery notes), modified as necessary to conform to the guidelines contained herein, should be used as the bench mark designation. For horizontal control stations or azimuth marks that have more than one year as part of their stampings, each year should be appended to the designation. Occasionally a horizontal control station may have the same designation as a nearby vertical control point. To distinguish between the two, append the letters BM to the vertical control point designation.

<u>Example:</u>	<u>Designation:</u>	
CHARLOTTE (USGS)	CHARLOTTE USGS	*
BOULDER 1935	BOULDER	*
CHICO 1948 1971	CHICO 1948 1971	*
SMITH 2 1961	SMITH 2	*
CHARLOTTSVILLE 1930 (horizontal control station)	CHARLOTTSVILLE	*
CHARLOTTSVILLE 1930 (nearby vertical control station)	CHARLOTTSVILLE BM	*

12. When the reference mark of a horizontal control point is included as a bench mark in a vertical control network, the name or designation of the reference mark in question, modified as necessary to conform to the guidelines contained herein, should be used as the bench mark designation. The name of a reference mark is normally formed by appending the symbols RM 1, RM 2, ..., RM 13, etc. to the name of the respective horizontal control point for reference marks stamped NO 1, NO 2, ..., NO 13, etc. Note: The designations of reference marks are not to include the year set (or stamped in the disk) unless the word "RESET" is part of the stamping.

<u>Example:</u>	<u>Designation:</u>	
CHARLOTTE NO. 1	CHARLOTTE RM 1	
BOULDER 1935 NO 6 1968	BOULDER RM 6	*
CHICO 1948 NO 3 RESET 1971	CHICO RM 3 RESET 1971	*

13. When the azimuth mark of a horizontal control point is included as a bench mark in a vertical control network, the name or designation of the azimuth mark in question, modified as necessary to conform to the guidelines contained herein, should be used as the bench mark designation. The name of an azimuth mark is normally formed by appending to the name of the respective horizontal control point the symbol AZ MK if only one azimuth mark is involved (as is the usual case), or else the symbols AZ MK 2, AZ MK 3, etc. for the azimuth marks stamped NO 2, NO 3, etc.

<u>Example:</u>	<u>Designation:</u>	
CHARLOTTE (azimuth mark)	CHARLOTTE AZ MK	
BOULDER 1935 NO.3	BOULDER AZ MK 3	
CHICO 1948 1971	CHICO AZ MK 1948 1971	*
N WASH AZI	N WASH AZ MK	
PARK AZ RESET 1965	PARK AZ MK RESET 1965	*

14. A temporary bench mark (TBM) must carry the letters "TBM" as the first three characters of the designation.

<u>Example:</u>	<u>Designation:</u>
TBM 1A	TBM 1 A
14	TBM 14

Note: The characters "BM", even when stamped in a disk, are not to be included in a vertical control point's designation unless: *

- a. There is a need to distinguish between a horizontal control point and a nearby vertical control point (see Section 11). *
- b. A vertical control point has no other stamping (e.g. BM USGS). *
- c. The characters "BM" do not represent the words "Bench Mark." *

Whenever the need arises for a guideline to deal with a situation not covered herein, the user is encouraged to communicate with the Director, National Geodetic Information Center (NGIC), to have the proposed guideline confirmed and incorporated in this ANNEX. *

The address and telephone number are: *

Director, NGIC *

National Geodetic Survey, OA/C18 *

Rockville, MD 20852 *

Telephone: 301-443-8281 *

15. The National Ocean Survey has instituted a system of standard designations for all Tidal and Water Level stations operated by NOS. The system provides for the unique identification of all disks, staffs, etc., located at such stations. *

For information concerning the proper designation of Tide Gage Bench Marks, Water Level Bench Marks, etc., communicate with: *

National Geodetic Survey *
Vertical Network Branch, OA/C132 *
Rockville, MD 20852 *
Telephone: 301-443-8567 *

For information concerning specific Tide Gage Bench Marks, etc., communicate with: *

National Ocean Survey *
Tides and Water Levels Division, OA/C23 *
Rockville, MD 20852 *
Telephone: 301-443-8487 *

HORIZONTAL CONTROL POINTS - TO BE COMPILED. Guidelines concerning the names and/or designations of horizontal control points, reference marks, and azimuth marks will be found in Volume 1, Chapter 2, of this publication.

ANNEX F

NGS SURVEY EQUIPMENT CODES

- 000-099 - Special Instrumentation
- 100-199 - Theodolites and Transists
- 200-299 - Leveling Instruments
- 300-399 - Leveling Rods and Staves
- 400-499 - Steel and Invar Tapes
- 500-599 - Lightwave Distance-Measuring Equipment
- 600-699 - Infrared Distance-Measuring Equipment
- 700-799 - Retro-Reflectors
- 800-899 - Microwave Distance-Measuring Equipment
- 900-999 - Unassigned

The purpose of the National Geodetic Survey (NGS) Survey Equipment Code is to provide a three-digit identifier for each item of survey equipment commonly used in connection with horizontal and vertical control surveys in the United States. The code has been devised in such a manner that the first digit of the three-digit identifier would indicate a specific category of survey equipment. Accordingly, there are ten broad survey equipment categories, the first of which (000-099) is reserved for special instrumentation, and the last (900-999) is as yet unassigned. The ten survey equipment categories are listed above.

Within each category, specific items and/or classes of survey equipment have been grouped into subcategories and assigned unique three-digit code numbers. The grouping of survey equipment into subcategories is intended to reflect the level of accuracy attained in common usage of the specific items or classes of survey equipment in question and not necessarily their intrinsic or potential accuracy. In each category and subcategory, a code is provided for items of survey equipment which do not appear among the items listed or which are not specifically identified. The respective lists of survey equipment are not all-inclusive, and series of numbers have been skipped in each category and/or subcategory to allow for additions.

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
------	--------------	--------------------------

000-099 - SPECIAL INSTRUMENTATION

000	Unspecified	Unknown Instrument or System
-----	-------------	------------------------------

001-009 - Reserved for Absolute Gravity Devices

010-029 - Gravimeters

010	Unspecified	Gravimeter
011	Frost	Frost Gravimeter
012	North American	North American Gravimeter
013	LaCoste-Romberg	Early Models
014	LaCoste-Romberg	G-Meter
015	LaCoste-Romberg	D-Meter
016	Worden	Unspecified
017	Worden	Uncompensated Model
018	Worden	Temperature-Compensated Model
019	Scintrex	CG-2

030-049 - Doppler Satellite Tracking Systems

030	Unspecified	Doppler Satellite Tracking System
031	Magnavox	Geoceiver or Geoceiver II
032	JMR	JMR-1
033	ITT	ITT 5500
034	Magnavox	MX-702A
035	APL	Tranet
036	Canadian Marconi	CMA 722A
037	Canadian Marconi	CMA 722B
038	Magnavox	MX-1502

100-199 - THEODOLITES AND TRANSITS

100	Unspecified	Theodolite or Transit
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101-199 - Instruments of Geodetic Astronomy

101	Various	Zenith Telescope
102	Various	Meridian Telescope, Transit, or Circle
103	Various	Bamberg-Type Astronomic Transit
104	Wild	T-4
105	Kern	DKM3-A
106	Gigas-Askania	TPR
107	Zeiss/Jena	Theo-002

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
<u>120-139 - First-Order (Geodetic) Theodolites</u>		
120	Unspecified	0"1, 0"2, 0"5 Direct-Reading Theodolite
121	Various	Ramsden-Type 30, 24, 12-inch Theodolite
122	Various	USC&GS Parkhurst
123	Wild	T-3
124	Kern	DKM3
125	CTS/Vickers	Geodetic Tavistock
126	Hilger-Watts	Microptic No. 3
<u>140-159 - Second-Order (Universal) Theodolites</u>		
140	Unspecified	1", 2", 5" Direct-Reading Theodolite
141	Various	USC&GS 7-inch Repeating Theodolite
142	Wild	T-2 or T-2E
143	Kern	DKM2 or DKM2-A
144	CTS/Vickers	V-400 Series
145	Hilger-Watts	Microptic No. 2
146	Dietzgen/Askania	A2 or A2E
147	Zeiss/Oberkochen	Th2
148	Zeiss/Jena	Theo-010 or Theo-010A
149	Nikon	NT-3 or NT-5
150	Sokkisha	TM-1A
151	Geotec	TH-01
<u>160-169 - Third-Order (Construction) Theodolites</u>		
160	Unspecified	Construction Theodolite or Transit
161	Various	10" Direct-Reading Theodolite or Transit
162	Various	20" Direct-Reading Theodolite or Transit
163	Various	30" Direct-Reading Theodolite or Transit
164	Various	1' Direct-Reading Theodolite or Transit
<u>170-179 - 30' or Coarser Angulation Devices</u>		
170	Unspecified	30' or Coarser Angulation Device
171	Various	30' or Coarser Theodolite or Transit
172	Various	30' or Coarser Compass Device
173	Various	30' or Coarser Protractor
<u>180-199 - Gyroscopic Theodolites</u>		
180	Unspecified	Gyro-Theodolite

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
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200-299 - LEVELING INSTRUMENTS

200	Unspecified	Leveling Instrument
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210-249 - Precise (Geodetic) Levels

210	Unspecified	Precise Level
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211-230 - Precise Spirit (Bubble-Vial) Levels

211	Various	USC&GS Fischer
212	USC&GS	Stampfer-Type (1877-1899)
213	Buff & Berger	Van Orden or Mendenhall
214	Various	Kern-Type (US Engineers)
215	Zeiss	Ni-III or Ni-A
216	Zeiss/Jena	Ni-004
217	Wild	N-3
218	Kern	NK3-M
219	Breithaupt	NABON
220	Fennel	Precise Level
221	Hilger-Watts	Precise Level
222	CTS/Vickers	Geodetic Level
223	Sokkisha	PL-5
224	Keuffel & Esser	Precise Level

231-249 - Precise Compensator (Self-Aligning) Levels

231	Zeiss/Oberkochen	Nil
232	Zeiss/Oberkochen	Ni2
233	Zeiss/Jena	Ni-002
234	Zeiss/Jena	Ni-007
235	Wild	NA-2 or NAK-2
236	Salmoiraghi	5190
237	MOM	Ni-A31
238	Sokkisha	B-1

250-289 - Engineer's (Universal) Levels

250	Unspecified	Engineer's Level
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251-270 - Engineer's Spirit (Bubble-Vial) Levels

251	Various	18-inch Dumpy-Type Level
252	Various	18-inch Wye-Type Level
253	Zeiss	Ni-II or Ni-B
254	Zeiss/Jena	Ni-030

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
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251-270 - Engineer's Spirit Levels - Continued

255	Wild	N-2 or NK-2
256	Kern	NK3
257	Kern	NK2
258	Kern	GK23
259	Breithaupt	NAKRE
260	Fennel	Engineer's Level
261	Hilger-Watts	Engineer's Level
262	CTS/Vickers	Engineer's Level
263	Salmoiraghi	5160 Series
264	Nikon	S2
265	Sokkisha	TTL-5 or TTL-6
266	Geotec	L-11 or L-21

271-289 - Engineer's Compensator (Self-Aligning) Levels

271	Zeiss/Oberkochen	Ni22
272	Zeiss/Jena	Ni-025
273	Kern	GK1-A
274	Breithaupt	AUTOM or AUCIR
275	Fennel	AUING
276	Hilger-Watts	AUTOSET
277	Salmoiraghi	5173, 5175, or 5180
278	Ertel	INA
279	Nikon	AE Series
280	Sokkisha	B-2
281	Geotec	AL-2 or AL-23

290-299 - Builder's (Construction) Levels

290	Unspecified	Builder's Level
291	Various	Builder's Dumpy-Type Spirit Level
292	Various	Builder's Tilting Spirit Level
293	Various	Builder's Compensator Level

300-399 - LEVELING RODS AND STAVES

300	Unspecified	Leveling Rod or Stave
-----	-------------	-----------------------

310-349 - Precise (Geodetic) Metal-Scale Rods

310	Unspecified	Precise Metal-Scale Rod
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CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
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310-349 - Precise Metal-Scale Rods - Continued

311	USC&GS	USC&GS Pre-Invar Rods
312	USC&GS	Invar (Introduced in 1916)
313	Zeiss/Oberkochen	Invar
314	Zeiss/Jena	Invar
315	Wild	Invar
316	Kern	Invar
317	Breithaupt	Invar
318	Fennel	Invar
319	Hilger-Watts	Invar
320	CTS/Vickers	Nilex
321	Salmoiraghi	Invar
322	Keuffel & Esser	Lovar
323	Gurley	Invar

350-389 - Engineer's Wooden Rods and Staves

350	Unspecified	Engineer's Wooden Rod or Stave
351	Various	US Engineers 12-foot Rigid Rod
352	Various	US Geological Survey 12-foot Rigid Rod

390-399 - Builder's Rods and Staves

390	Unspecified	Builder's Rod or Stave
391	Various	Philadelphia Rod
392	Various	Chicago Rod
393	Various	California Rod
394	Various	12-foot Folding Rod

400-499 - STEEL AND INVAR TAPES

400	Unspecified	Steel or Invar Tape
-----	-------------	---------------------

420-439 - Calibrated Invar Tapes

420	Unspecified	Calibrated Invar Tape
421	Various	25-meter Calibrated Invar Tape
422	Various	50-meter Calibrated Invar Tape

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
<u>440-459 - Calibrated Steel Tapes</u>		
440	Unspecified	Calibrated Steel Tape
441	Various	30-meter Calibrated Steel Tape
442	Various	100-foot Calibrated Steel Tape
443	Various	300-foot Calibrated Steel Tape
<u>460-479 - Uncalibrated Steel Tapes</u>		
460	Unspecified	Uncalibrated Steel Tape or Ruler
461	Various	30-meter Uncalibrated Steel Tape
462	Various	100-foot Uncalibrated Steel Tape
463	Various	300-foot Uncalibrated Steel Tape
<u>500-599 - LIGHTWAVE DISTANCE-MEASURING EQUIPMENT</u>		
500	Unspecified	Lightwave Electro-Optical DME
501	AGA	Geodimeter Model 1
502	AGA	Geodimeter Model 2 or 2A
503	AGA	Geodimeter Model 3
504	AGA	Geodimeter Model 4A, 4B, or 4D
505	AGA	Geodimeter Model 4L
506	AGA	Geodimeter Model 6
507	AGA	Geodimeter Model 6A
508	AGA	Geodimeter Model 6B
509	AGA	Geodimeter Model 6BL
510	AGA	Geodimeter Model 7T
511	AGA	Geodimeter Model 700 or 710
512	AGA	Geodimeter Model 76 or 78
513	AGA	Geodimeter Model 8
531	Keuffel & Esser	LSE Ranger I, II, or III
532	Keuffel & Esser	LSE Ranger IV
533	Keuffel & Esser	LSE Ranger V
534	Keuffel & Esser	LSE Rangemaster
541	Spectra-Physics	Geodolite 3G
542	Spectra-Physics	Transitlite LT-3
551	Kern	ME-3000 Mekometer

CODE	MANUFACTURER	INSTRUMENT MODEL OR TYPE
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600-699 - INFRARED DISTANCE-MEASURING EQUIPMENT

600	Unspecified	Infrared Electro-Optical DME
601	AGA	Geodimeter Model 12
611	Plessey	Tellurometer CD-6
612	Plessey	Tellurometer MA-100
621	Wild	Distomat DI-3 Series
622	Wild	Distomat DI-10 Series
631	Kern	DM-500
632	Kern	DM-1000 or DM-2000
641	Zeiss/Oberkochen	SM 11 or RegElta 14
642	Zeiss/Oberkochen	Eldi Series
643	Zeiss/Oberkochen	SM 4
651	Keuffel & Esser	LSE Microranger or Microranger II
652	Keuffel & Esser	LSE Autoranger
661	Hewlett-Packard	3800
662	Hewlett-Packard	3805 or 3810
671	Cubic	Cubitape DM-60
672	Cubic	HDM-70
681	Carrol & Reed	Akkuranger Mark I
691	Nikon	Beetle 500 or 500S
692	Nikon	Beetle 1000 or 1000S

700-799 - RETRO-REFLECTORS

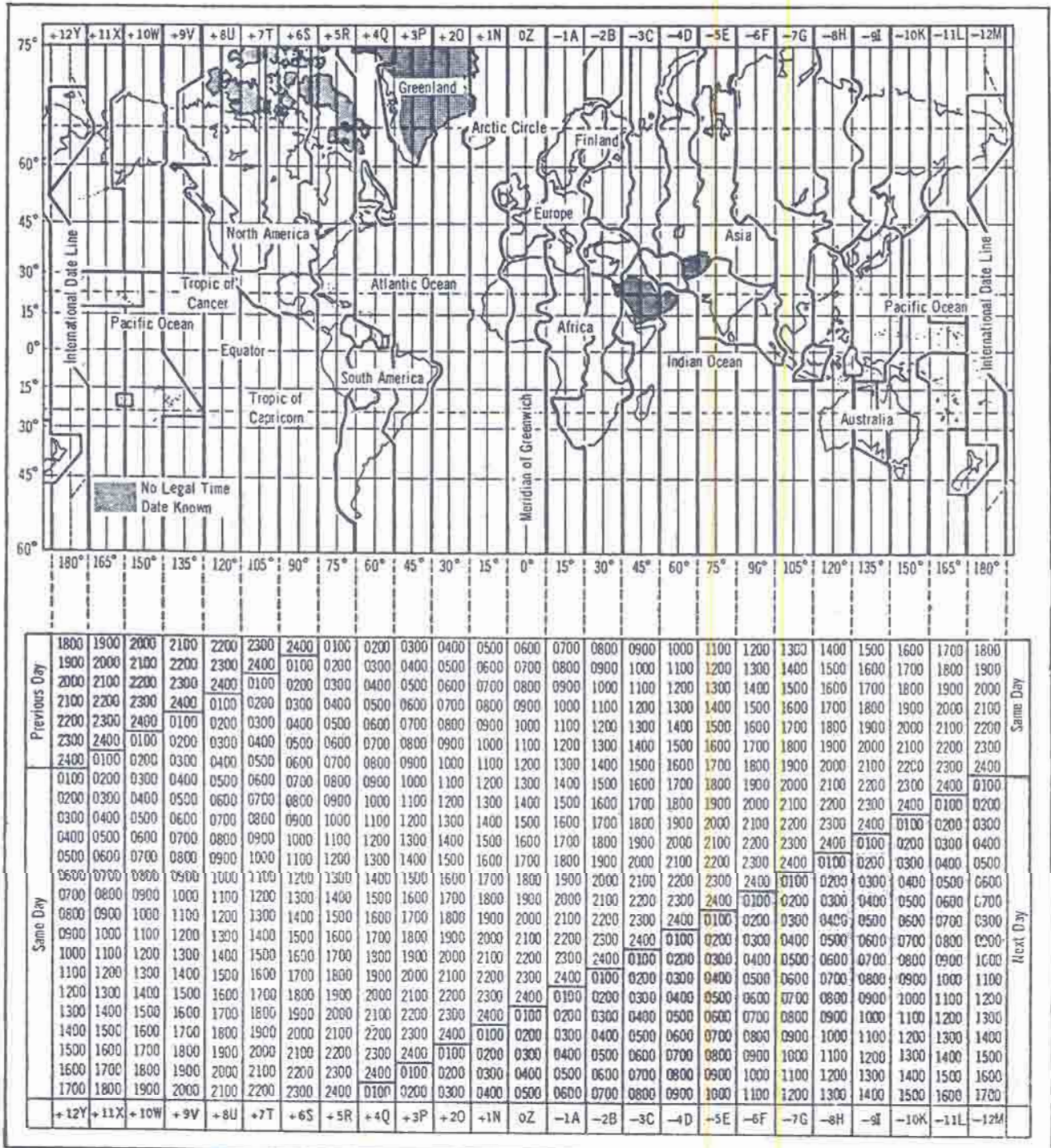
700	Unspecified	Retro-Reflector
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800-899 - MICROWAVE DISTANCE-MEASURING EQUIPMENT

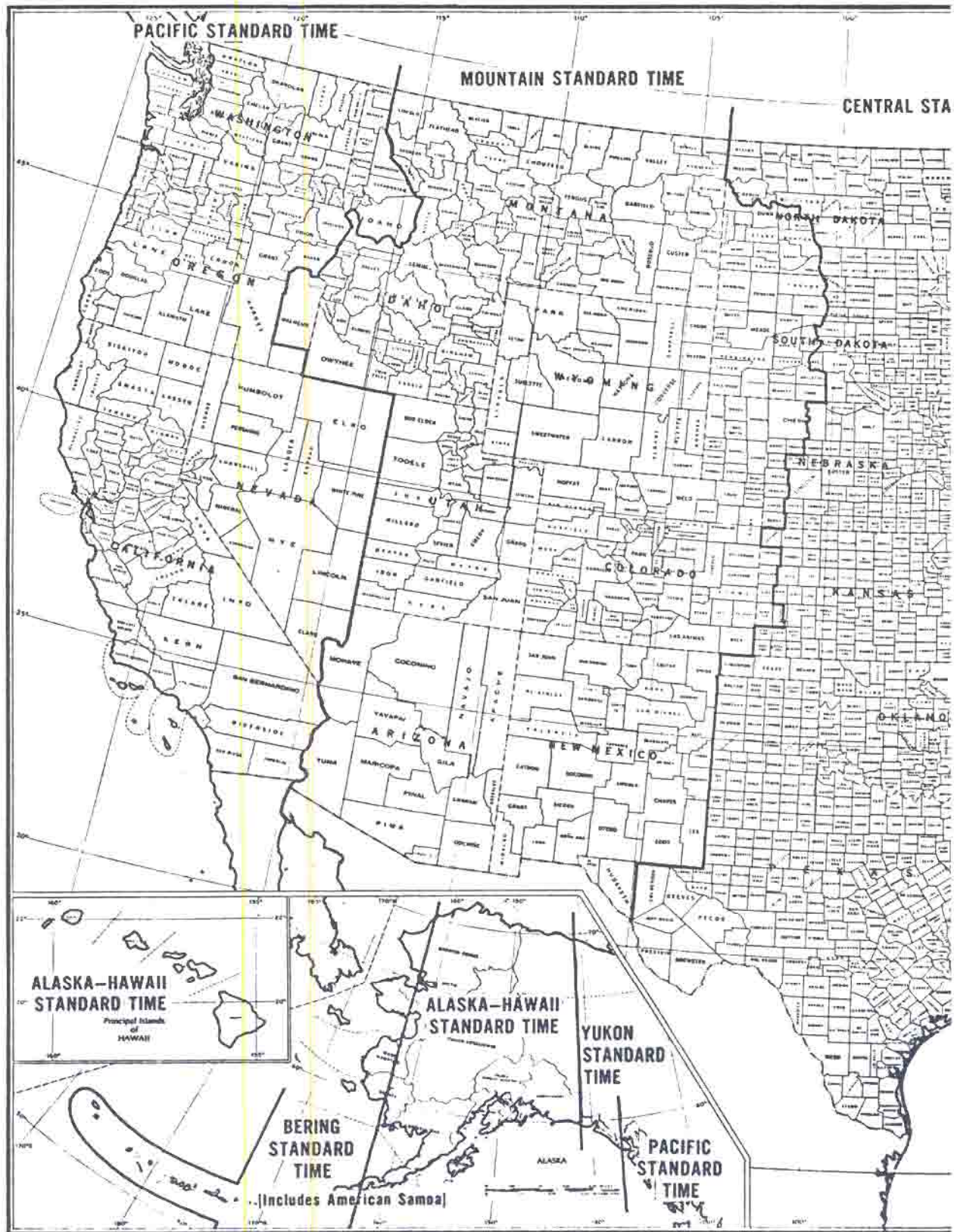
800	Unspecified	Microwave Electro-Magnetic DME
801	Plessey	Tellurometer MRA-1
802	Plessey	Tellurometer MRA-2
803	Plessey	Tellurometer MRA-3
804	Plessey	Tellurometer MRA-4
805	Plessey	Tellurometer MRA-5
809	Plessey	Tellurometer CA-1000
831	Wild	Distomat DI-50
832	Wild	Distomat DI-60
841	Cubic	Electrotape DM-20
851	Fairchild	Microchain

ANNEX H

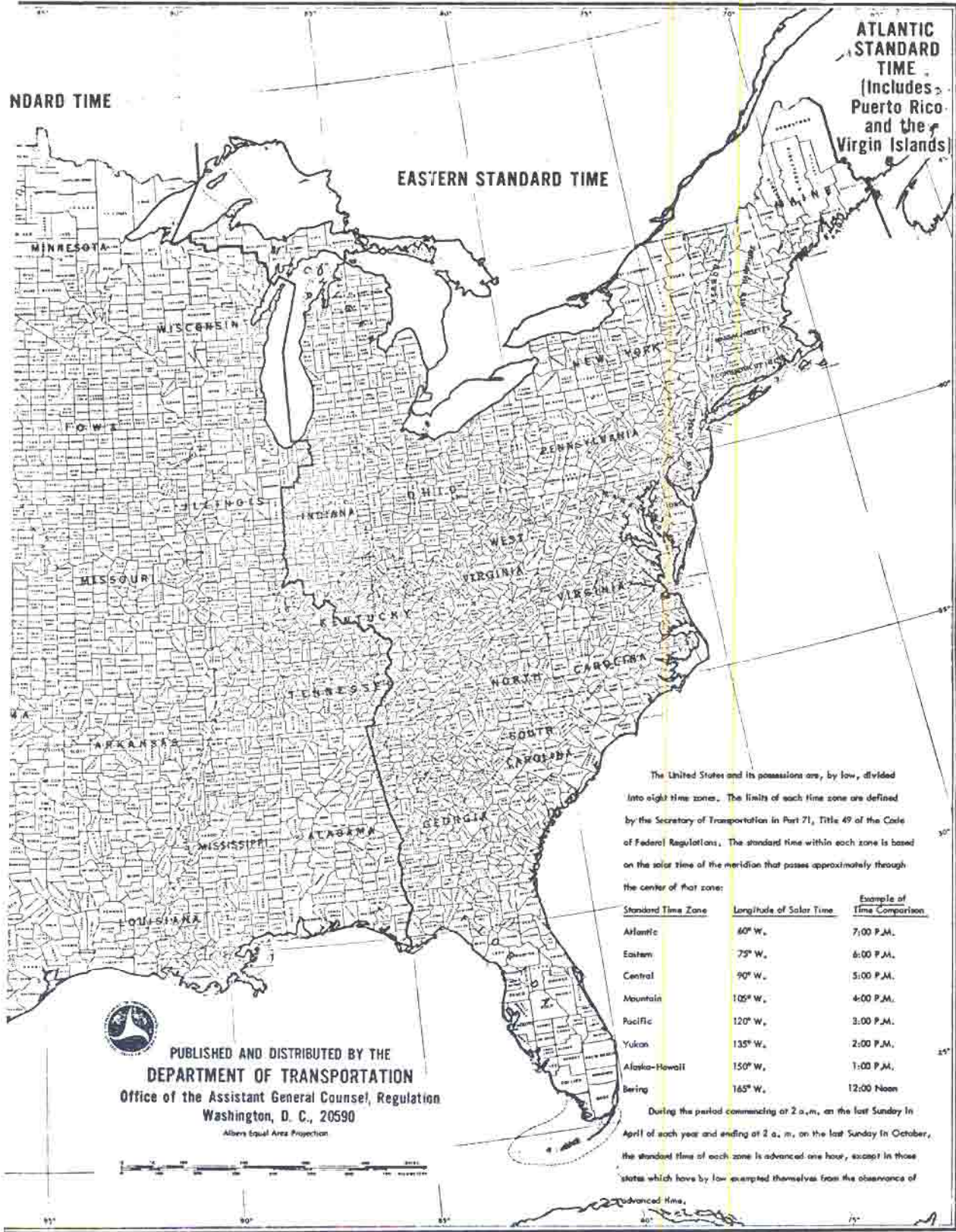
STANDARD TIME ZONES



STANDARD TIME ZONES



OF THE UNITED STATES



ATLANTIC STANDARD TIME
 (Includes Puerto Rico and the Virgin Islands)

EASTERN STANDARD TIME

CENTRAL STANDARD TIME

The United States and its possessions are, by law, divided into eight time zones. The limits of each time zone are defined by the Secretary of Transportation in Part 71, Title 49 of the Code of Federal Regulations. The standard time within each zone is based on the solar time of the meridian that passes approximately through the center of that zone:

Standard Time Zone	Longitude of Solar Time	Example of Time Comparison
Atlantic	60° W.	7:00 P.M.
Eastern	75° W.	8:00 P.M.
Central	90° W.	5:00 P.M.
Mountain	105° W.	4:00 P.M.
Pacific	120° W.	3:00 P.M.
Yukon	135° W.	2:00 P.M.
Alaska-Hawaii	150° W.	1:00 P.M.
Bering	165° W.	12:00 Noon

During the period commencing at 2 a.m. on the last Sunday in April of each year and ending at 2 a.m. on the last Sunday in October, the standard time of each zone is advanced one hour, except in those states which have by law exempted themselves from the observance of advanced time.



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 Albers Equal Area Projection



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ANNEX J

SUMMARY OF CODES USED IN BENCH MARK DESCRIPTIONS

This ANNEX contains lists of codes which are used in the preparation of original and recovery descriptions pertaining to vertical control points (bench marks). The use of these codes is explained in Chapter 7, entitled VERTICAL DESCRIPTIVE (VERT DESC) DATA. See ANNEX I for a summary of codes used in connection with station descriptions and recovery notes pertaining to horizontal control points.

DRC CODE - used to identify the descriptive data as to its type;

- D - self-standing original description
- R - self-standing recovery description
- C - combined set consisting of one complete original or recovery description followed by abridged subsequent recovery description(s) for the same bench mark.

AGENCY CODE - used to indicate the organization or type of organization which physically set the vertical control point, or in the case of a recovery of an existing vertical control point, the organization or type of organization which recovered the vertical control point.

*
*
*
*

- 0 - unknown
- 1 - NGS or CGS (USC&GS)
- 2 - U.S. Geological Survey (USGS)
- 3 - U.S. Department of Defense (DOD)
- 4 - other federal or interstate agency
- 5 - state agency
- 6 - county, city, or regional agency
- 7 - commercial organization or private firm
- 8 - National Ocean Survey (NOS)
- 9 - foreign government agency

OTHER CONTROL CODE - used to indicate the existence of other geodetic control or a special characteristic of the vertical control point.

- A - astronomic observation(s) for the mark resides in the NGS Data Base
- F - fault site
- G - gravity observation(s) for the mark resides in the NGS Data Base
- H - horizontal geodetic coordinates of the mark reside in the NGS Data Base.
- M - magnetic station
- N - no vertical control (not connected to the national vertical geodetic control network)
- O - other (see descriptive text)
- T - tidal bench mark

*
*
*
*
*

- X - recovery description written for this survey point during current project, but first leveling tie to the NGS Vertical Network was made in this current project *
- Z - survey point previously tied to the NGS Vertical Network and recovery description written in this current project, but survey point was not leveled in this current project *

CONDITION CODE - used to indicate the condition of the monument or mark as determined upon the recovery of the vertical control point.

- G - good, fair
- N - not recovered, not found, lost
- O - other (see recovery text)
- P - poor, disturbed, mutilated
- X - destroyed

SETTING CLASSIFICATION CODE - used to indicate the setting characteristics of the monument or mark.

	Default Monumentation	Quality Code
00 - unspecified.....	D	*

Shallow Settings (less than 10ft):

- 10 - unspecified shallow..... D
- 11 - metal rod with base plate..... C
- 12 - concrete post..... C
- 13 - shallow-set pipe..... D
- 14 - shallow-set metal rod (without base plate)..... D

Unsleeved Deep Settings (10ft or more):

- 20 - unspecified deep..... C
- 21 - copper-clad steel rod..... B
- 22 - galvanized steel pipe..... B
- 23 - galvanized steel rod..... B
- 24 - stainless steel rod..... B
- 25 - aluminum alloy rod..... B

Rocks and Boulders:

- 30 - unspecified rock..... B
- 31 - rock outcrop, rock ledge, rock cut, or bedrock.. A
- 32 - boulder..... C

Structures:

- 40 - light structures (other than listed below)..... D
- 41 - pavements (street, sidewalk, curb, apron, etc.). D
- 42 - retaining walls (e.g. culverts and small bridges)..... C
- 43 - piles and poles (e.g. spike in utility pole).... D

44 - footings/foundation walls of small/medium structures.....	C
45 - mat foundations (landings, platforms, steps, etc.).....	C
50 - massive structures (other than listed below).....	B
51 - massive retaining walls.....	B
52 - abutments and piers of large bridges.....	B
53 - tunnels.....	B
54 - massive structures with deep foundations.....	A
55 - large structures with foundations on bedrock.....	A

Sleeved Deep Settings (10ft or more):

60 - unspecified rod/pipe in sleeve.....	B
61 - copper-clad steel rod in sleeve.....	B
62 - galvanized steel pipe in sleeve.....	A
63 - galvanized steel rod in sleeve.....	A
64 - stainless steel rod in sleeve.....	A
65 - aluminum alloy rod in sleeve.....	A

MONUMENTATION QUALITY CODE - may be entered in column 53 of the *27* record to override the above default codes which are softwareed into the descriptions for publication. *
*
*

- | | |
|---|---|
| A - monuments of the most reliable nature which may be expected to hold their elevations very well. | * |
| B - monuments which probably hold their elevations well. | * |
| C - monuments which may hold their elevations but which are commonly subject to surface ground movements. | * |
| D - monuments of questionable or unknown reliability. | * |

MONUMENTATION CODE - used to identify the type of monument or mark.

B - bolt	I - metal rod	S - spike
C - cap-and-bolt	N - nail	T - chiseled triangle
D - survey disk (any type)	O - chiseled circle	V - stone monument
F - flange-encased rod	P - pipe cap	X - chiseled cross
H - drill hole	Q - chiseled square	Z - other (see description)
	R - rivet	

DISK TYPE - used with MONUMENTATION CODE D (survey disk) only.

- 00 - unspecified
- 01 - bench mark disk
- 02 - tidal bench mark disk
- 03 - triangulation station disk
- 04 - traverse station disk
- 05 - topographic station disk
- 06 - survey disk (not listed)
- 07 - reference mark (RM) disk
- 08 - azimuth mark (Az Mk) disk
- 09 - gravity station disk
- 10 - gravity reference mark disk
- 11 - magnetic station disk

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ANNEX K

DATA TRANSMITTAL INSTRUCTIONS

Information concerning data preparation and transmittal to NGS is found in Chapter 1, HORIZONTAL CONTROL (HZTL) DATA, and in Chapter 5, VERTICAL CONTROL (VERT) DATA. The point of contact at NGS for questions concerning the User's Guide to the "Formats and Specifications of the National Geodetic Survey Data Base" is Mr. James E. Stem. His address and telephone number are:

James E. Stem
National Geodetic Survey, OA/C1x4
Rockville, Maryland 20852
Telephone: (301) 443-8749

*

Data sent to NGS via U.S. Postal Service should be addressed:

*

Director, National Geodetic Survey
Attn: OA/C17x4
Rockville, Maryland 20852

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Data sent to NGS via United Parcel Service or similar commercial carrier should be addressed:

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Director, National Geodetic Survey
Attn: OA/C17x4
Rockwall Building, Room 26
11400 Rockville Pike
Rockville, Maryland 20852

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